

Abdominal Trauma by Impalement. Clinical Case

Alejandro Alberto Flores-López

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Onasis Pinzón-Oregón

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Luis Arturo Falcón-Cancino

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Segundo Yépez-Vallejo

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Mónica Ríos-Pacheco

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Héctor Gerardo Lujan-Vargas

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Fidel Echavarría-Fernández

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Guillermo Padrón-Arredondo

Genera Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

Alejandro L. Villalobos-Rodríguez

General Surgery Service of the General Hospital De Playa Del Carmen.
Constituyentes Avenue with 135 Street, Ejidal Suburb. Solidaridad,
Playa del Carmen, Quintana Roo, México

ABSTRACT

Introduction: Impalement injury is one of the most spectacular and potentially dramatic rare forms of penetrating trauma. [2,3] In many cases, the impaled patient dies at the scene.[3] The patient who manages to reach the hospital alive and is hemodynamically stable has a good chance of overcoming a traumatic event. However, the non-removal of a foreign object represents the cornerstone of initial treatment, as possible vascular lesions remain compressed by the object in situ, thus avoiding irrepressible hemorrhages. **Clinical case:** A 32-year-old male was brought in by a paramedic after suffering electrical burns to the right thoracic limb and right pelvic limb that caused a fall from a power pole with subsequent penetrating abdominal trauma due to impalement. He denies antecedents of importance for the current condition. Upon arrival, he was hemodynamically stable, with the presence of a first-degree electrical burn in the right hand and forearm and the right thigh, as well as a metallic rod passing through the abdomen from the left groin to the right flank, for which it was decided to perform Exploratory Laparotomy who reported the following **findings:** Intestinal perforation of more than 50% of the lumen at jejunum level, side-to-side anastomosis was performed. During his stay on the floor of General Surgery, he had a torpid post-surgical evolution, intolerance to the oral route, abdominal distension, absence of gas channeling, and symptoms of intestinal obstruction, for which it was decided to perform a new Exploratory Laparotomy, finding intestinal stenosis at the level of the previous anastomosis was dismantled and reconstructed in side by side, on this occasion with favorable evolution and he was discharged due to improvement after 14 days of hospital stay. **Discussion:** Prehospital emergency medicine (PHEM) offers unique and challenging perspectives to orthodox emergency medicine. Impalements are extremely rare and often require a multidisciplinary team approach in the prehospital setting. Most cases of impalements are fatal at the scene. Patients surviving the initial trauma and arriving at the hospital alive, usually make a good recovery with multidisciplinary team management underpinning the importance of meticulous prehospital care in transporting patients with impalements safely. This case highlights the role of PHEM clinicians as experts in clinical knowledge, decision-making, leadership, team working skills, and improvisations.

Keywords: Stab wound Impalement, Iron bar, fall from height injury, Small bowel injury

INTRODUCTION

Impalement injury is one of the most spectacular and potentially dramatic rare forms of penetrating trauma. In many cases, the impaled patient dies at the scene. A patient who manages to reach the hospital alive and is hemodynamically stable has a good chance of overcoming a traumatic event. However, the non-removal of a foreign object represents the cornerstone of initial treatment, as possible vascular lesions remain compressed by the object in situ, thus avoiding irrepressible hemorrhages (1).

Penetrating perineum injuries are rare emergencies in children with a reported incidence of 4-6 % of injuries of any etiology. Impalement injury constitutes the penetration of the body by an object such as a rod, pole, etc., alongside the complete perforation of a central body mass. These types of injuries are often life-threatening with high morbidity and mortality owing to their complex injury patterns and risk of massive pelvic bleeding (2).

Impalement and anorectal injuries are rarely observed during childhood. Nevertheless, they can have high mortality and morbidity rates. While falling from construction sites is usually seen in adults, in children, anorectal injuries occur due to sliding down from trees, falling on sharp objects in the sitting position while playing, or sexual assault. These traumas are not limited to the anorectal region but can cause serious problems in every region that the foreign body passes through. Sometimes, a very careful examination should be performed on the patients from whom foreign bodies are removed, and extraperitoneal bladder rupture should not be missed even if the anorectal examination appears to be normal (3).

CLINICAL CASE

A 32-year-old male was brought in by a paramedic after suffering electrical burns to the right thoracic limb and right pelvic limb that caused a fall from a power pole with subsequent penetrating abdominal trauma due to impalement. He denies antecedents of importance for the current condition (figure 1).

Upon arrival, he was hemodynamically stable, with the presence of a first-degree electrical burn in the right hand and forearm and the right thigh, as well as a metallic rod passing through the abdomen from the left groin to the right flank, for which it was decided to perform Exploratory Laparotomy who reported the following findings: Intestinal perforation of more than 50% of the lumen at jejunum level, End-to-End anastomosis was performed.

During his stay on the floor of General Surgery, he had a torpid post-surgical evolution, intolerance to the oral route, abdominal distension, absence of gas channeling, and symptoms of intestinal obstruction, for which it was decided to perform a new Exploratory Laparotomy, finding intestinal stenosis at the level of the previous anastomosis was dismantled and reconstructed in side by side by on this occasion with favorable evolution and he was discharged due to improvement after 14 days of hospital stay.



Figure 1.

DISCUSSION

Perineal impalement injury is catastrophic. As in this case, falling on the offending objects is often responsible for the injury. As high as 25% of victims die before reaching the health facility or within a few hours after the incident due to uncontrollable hemorrhage. Also, those who

survive massive resuscitation, and even after reaching hemostasis, are prone to develop septic complications which can appear in up to 80% of patients with perineal trauma. Thus, the presence of vital organ injury, amount of blood loss, and injuries of adjacent organs. This might probably affect the depth and impact it can have on the inner body structures as the traumas are not only limited to the anorectal region but can affect every region that the foreign body passes through. This mandates a thorough examination. Considering the complexity of the injury and the rarity of the case, there are no established standard treatment guidelines. Every trauma patient arriving at the Emergency department should initially be treated following the ATLS protocol and so was done in our case (4).

The common causes of impalement injuries as reported in the literature are the fall of an object over the victim, sexual activity, mistakenly sitting over the object, playing, and road traffic crashes. In impalement injuries, removal of the foreign body is less important than hemorrhage control and preventing further tissue damage. Uncontrolled, unsupervised, scene site removal of the object may kill the victim because the object might be controlling the bleeding from the injury site. Overall management of such patients requires meticulous planning (e.g. clinical assessment with an appropriate investigation, a specialized expert surgeon in call) and decisions (based on clinical and radiological judgment) before exploring and removing the object (5). Prehospital emergency medicine (PHEM) offers unique and challenging perspectives to orthodox emergency medicine. Impalements are extremely rare and often require a multidisciplinary team approach in the prehospital setting. Most cases of impalements are fatal at the scene. Patients surviving the initial trauma and arriving at the hospital alive, usually make a good recovery with multidisciplinary team management underpinning the importance of meticulous prehospital care in transporting patients with impalements safely. This case highlights the role of PHEM clinicians as experts in clinical knowledge, decision-making, leadership, team working skills, and improvisations (6).

Penetrating abdominal injury is a type of serious trauma that is extremely challenging in clinical work, often accompanied by multiple organ damage and dysfunction, massive bleeding, hemodynamic instability, and even respiratory and circulatory failure. It is usually complicated, urgent, and critical, and the treatment of patients with penetrating injuries is rugged and arduous. Due to the special anatomical structure of the human body, choosing the appropriate surgical method according to the patient's body injury will maximize the chance of successful rescue (6). Small bowel injury is one of the most common abdominal injuries following a penetrating mechanism and occurs in about 50% of patients, followed by a colon and solid organ injuries (7). The most common penetrating mechanism that causes bowel wall injuries is gunshot wounds, stab wounds, or impaled objects. Prior studies have demonstrated that early operative intervention in unstable hemodynamic trauma patients reduces mortality. There is very little controversy regarding immediate intervention in hemodynamically unstable patients. One of the quality indicators of the American College of Surgeons Committee on Trauma is that when hemodynamically unstable patients present with intra-abdominal injuries requiring laparotomy, the laparotomy should be performed within an hour of the patient's arrival at the hospital (8). In Central Europe, abdominal penetrating trauma, such as stab injuries or gunshot wounds, is very uncommon with a low incidence (0.1%) (9). Adult perineal impalement injuries are even more uncommon, several vital organs could be damaged in the pelvic cavity, and thus they usually present with complex injury patterns and risk of massive pelvic bleeding. In many cases, the impaled patient dies at the scene, but the ones who manage

to reach the hospital alive and are hemodynamically stable have a good chance of overcoming the traumatic event. There are no accepted guidelines for managing those injuries in the existing literature; therefore, they present a rare challenge for the treating surgeon (10). Rosado et al, (11) present a case of a male patient aged 34 years-old was admitted to the emergency department by presenting penetrating wounds pelvis, abdomen and chest 30 minutes of evolution caused by two rods one inch in diameter. Abdominal exploratory laparotomy performed plus left thoracotomy with the following findings: the first rod penetrates right flank, drills left hepatic lobe, left extrapulmonary and penetrates in left lung field. The second rod has trajectory approximately 20 cm below the first rod via retroperitoneal, proceeded to the removal of both. This patient did not injury of vital organs and survived despite the impressive thing about his wounds.

Funding

This work did not receive any funding

Ethical Approval

Nothing to declare.

References

1. Ugoletti L, Zizzo M, Castro Ruiz C, et al. Gluteal, abdominal, and thoracic multiple impalement injuries. A case report on the management of a complex polytrauma, *Medicine*. 2019; 98:22. <http://dx.doi.org/10.1097/MD.00000000000015824>
2. Man Shresthaa B, Prasad Koirala D, Shrestha S, et al. Impalement injury of the perineum with an iron rod with a minimal injury: A near miss: A case report. *Int J Surgery Case Rep*. 2021; 80 105645 <https://doi.org/10.1016/j.ijscr.2021.105645>
3. Ozaydin S, Gulleroglu A, Karaaslan B, et al. Penetrating injury caused by a long iron bar: A case report, *North Clin Istanbul*. 2018; 5(1):75-78. Doi: 10.14744/nci.2017.75508
4. Katiyar A, Kumar A, Kumar N. An unusual mechanism of hook impalement injury - A case report. *Trauma Case Rep*. 2020; 28. 100332 <https://doi.org/10.1016/j.tcr.2020.100332>
5. Jawaid S, Cody D. *BMJ Case Rep* 2018; 11: e227293. Doi:10.1136/bcr-2018-227293
6. Liu Y, Xu Q, Zhu H, et al. Rare penetrating abdominal injury caused by falling from height: Miraculously good prognosis. *Front Surg*. 2022; 9:1018003. Doi: 10.3389/fsurg.2022.1018003
7. Bhimji SS, Burns B: Penetrating Abdominal Trauma. StatPearls Publishing LLC, Treasure Island, FL; 2019.
8. Ahmed N, Kuo Y, Lepis G. Emergency Laparotomy and Outcomes in Penetrating Small Bowel Perforation in Unstable Patients. *Cureus* (October 29, 2019; 11(10): e6022. Doi 10.7759/cureus.6022
9. Malkomes P, Störmann P, El Youzouri H, et al. Characteristics and management of penetrating abdominal injuries in a German level I trauma center, *Eur J Trauma Emerg Surg*. (2019; 45(2):315–21.
10. Janeža J, Stupana U, Norčič G. Conservative management of abdominoperineal impalement trauma- A case report. *Int J Surg Case Rep*. 2020; 76 41-5.
11. Rosado-Montero MAT, Padrón-Arredondo G, Pelagio-Peña R. Double abdomino-thoracic and pelvic impalement, *Rev Salud Q. Roo*. septiembre-diciembre 2015; 8(32):20-23.