GAVIN PUBLISHERS

OPEN ACCESS

Annals of Case Reports

Díaz-García A, et al. Ann Case Report 6: 657.

DOI: 10.29011/2574-7754.100657

Case Report

Penetrating Abdominal Trauma, an Uncommon Surgical Challenge

Díaz-García A*, Orti-Rodríguez RJ, Díaz-Jiménez N, Barrera-Gómez MA

Department of General Surgery, Hospital Universitario Nuestra Señora de Candelaria, Spain

***Corresponding author:** Díaz-García A, Department of General Surgery, Hospital Universitario Nuestra Señora de Candelaria, Ctra. Gral. del Rosario, 145, 38010 Santa Cruz de Tenerife, Spain

Citation: Díaz-García A, Orti-Rodríguez RJ, Díaz-Jiménez N, Barrera-Gómez MA. (2021) Penetrating Abdominal Trauma, an Uncommon Surgical Challenge. Ann Case Report 6: 657. DOI: 10.29011/2574-7754.100657

Received Date: 26 April, 2021; **Accepted Date:** 07 May, 2021; **Published Date:** 11 May, 2021

Abstract

Introduction: Penetrating injuries are responsible for fewer than 15 % of traumatic deaths worldwide, although these rates vary by country.

Case report: A 40 years old woman was admitted in our hospital due to a penetrating abdominal trauma with hemodynamic stability. There was a foreign body (automatic door lathe) with entrance in the left iliac fossa and an outlet in the right gluteus, passing through right iliac blade. A controlled extraction of the object was performed in the operating room. A subcutaneous path without penetration into the abdominal cavity was found. Given the high risk of surgical infection and to accelerate the closure, vacuum therapy device (Renasys©, Smith & Nephew) was decided on, with a sponge that occupied the entire path and which was removed at 72 hours to be replaced by another vacuum therapy device on skin and wounds, already closed.

Discussion: Penetrating abdominal trauma usually have important morbimortality. It is necessary to rule out associated abdominal complications. Vacuum therapy reduces the risk of infection and accelerates wound closure.

Conclusion: It is essential to assess the damage after penetrating trauma, with an adequate control of the wound due to the high risk of infection.

Keywords: Penetrating abdominal trauma; Trauma surgery; Vacuum therapy

Introduction

Traumatic injuries are the first cause of death between the 1st and 34th year of life [1]. Depending on the injury, traumatic injuries are divided into blunt or penetrating trauma. Penetrating injuries, are also subdivided in two different groups: stab or gunshot wounds [2]. Impalement injuries, which consist in a rare type of mechanical injury following a forceful insertion of a projecting object into the body [3], associates the highest morbidity and mortality among all traumatic lesions. Most of this injuries are typically accidental, and its management suposes a major challenge for surgeons [3,4]. We present a case of impalement injury in our centre, and a review of the management of these complex injuries.

Case

A 40-year-old woman was brought to the emergency department of our tertiary hospital after a car accident in her garage. The patient was admitted, well oriented and fully conscious, with hemodynamic stability. Her pulse rate was 87 beats per minute and her blood pressure 120/70 mmHg. There was no external active bleeding. She had an urinary catheter, with normal urination rate. Fluid infussion was initiated, a prophylactic broad spectrum antibiotic coverage started and a dose of tetanus vaccine was administrated. Her abdominal examination revealed a transabdominal impalement injury (Figure 1) with a metallic object measuring 100 cm in length (Figure 2), impacted and in situ. Her abdomen was soft but tender without any sign of peritonitis.

Figure. 1 Transabdominal impalement injury

Figure. 2. Impaled metallic object

Due to the dimensions of the object and because was not possible to shorten it, the pre-surgical abdominal radiological evaluation was not performed. Therefore the patient was directly transferred to the operating theater, where she received general anesthesia. From the ambulance transport of the patient to her arrival in the operating theater, there was always a person holding the object and keeping it stable. The entry wound was in the left iliac fossa, with an exit wound located in the right gluteus, passing through the right iliac blade. A controlled extraction of the object was done after a midline laparotomy was performed as the first step for a damage control surgery. Surprisingly, a subcutaneous path without penetration into the abdominal cavity was found. An extensive debridement and wound washing was done. Given the high risk of surgical infection and to accelerate the closure, vacuum therapy was decided on, with a sponge from a Renasys© (Smith & Nephew) device that occupied the entire path (Figure 3).

Just after the operation and as part of our hospital protocol with polytraumatized patients, a full body CT scan was performed in order to rule out any other lesions. No associated lesions were visualized, just a right iliac blade fracture (Figure 4). The vacuum therapy device was removed after 72 hours, and was replaced, once wounds were already closed, with another vacuum therapy device on skin (PICO©, Smith & Nephew). The patient had an uneventful postoperative evolution, so she was discharged on 4th postoperative day. No evidence of wound infection or any other complications were reported during follow-up.

Figure. 3. Vacuum therapy device

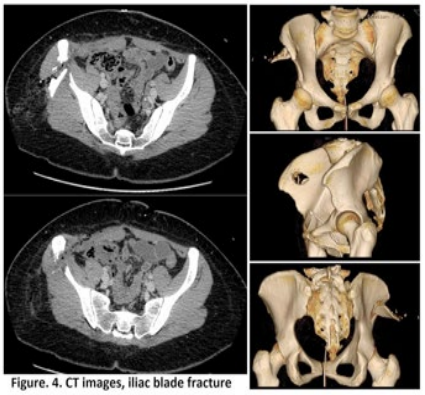

Figure. 4. CT images, iliac blade fracture

Discussion

Impalement injuries commonly occur as a result of impact between human body and an immobile object. The typical mechanisms of these injuries are accidental falls or motor vehicle collisions in which a protruding object is involved [5]. In our case, the patient was accidentally pushed onto a methalic bar part of her garage door lathe.

Impaled patients often present with complex both blunt and penetrating injuries. Therefore a complete assessment of the entire patient is mandatory to identify other associated life-threatening injuries [6]. In addition to crush injury, other types of different injuries can be found: wound contamination, underlying organ injury, and neurovascular damage [7]. Thoracoabdominal injuries are the ones wiht higher mortality rates due to the involvement of vital organs such as heart, lungs, or major blood vessels [8]. The external presentation of the patient may not fully reflect the severity of the internal life-threatening injuries [9], so surgeons, anesthesiologists and all the theatre staff should be ready for any major complication. Fortunately, in our case there was no damage in any vital organ or major blood vessels, although a fracture of the right iliac bone was found, without any other related injuries. As recommendation of Traumatology department, an orthopedic treatment was done for iliac bone fracture with no need of any surgical procedure.

Management of penetrating throacoabdominal injury is a widely recognized clinical challenge, as injury patterns, management strategies, and clinical outcomes remain undescribed across a large population [10]. Series of case reports on impalement injuries have emphasized caution at manipulating the penetrating object at the incident site. In fact, general recommendations advise that the penetrating object should be left in situ avoiding any manipulation or removal if possible and reduced to a size or length which can enhance the patient being transported to a medical reference center [11]. These recommendations aims to reduce severe life-threatening hemorrhage by keeping the tamponading effect by the penetrating object in a large vessel and also avoid breakage of the impaling object [9]. First assessment of any traumatized patient must be fast and systematic. In our case, as we were previously notified of the arrival of the patient to our tertiary hospital, first assessment and initial measures were taken quickly and effectively. All patients presenting at Emergency Department after thoracoabdominal trauma should be screened for lesions according to ATLS protocol [12].

Hemodynamic stability, does not rule out associated vascular lesions, so it is prudent to proceed with selective radiological investigations to know the extent of injury and trajectory of impaling object [6]. On the contrary, in case of haemodynamic instability, peritonitis or evisceration, surgical exploration is considered mandatory without any previous radiological investigations [13]. Due to the dimensions of the penetrating object, it was impossible to complete the radiological study before taking the patient to the operating theater. The penetrating object should be removed only when the affected cavity or cavities are properly explored. In our case, it was not necessary to assess the abdominal cavity as we checked the subcutaneous path of the penetrating object.

Surgical approach should take into account for the entry and exit wound, so as to allow the removal of object under direct vision [6]. The crushed soft tissue by the contaminated impaling object is a serious source of infection which should be considered in any type of impalement injury and suitable measures should be taken accordingly [14]. The wound should be thoroughly debrided to remove all devitalized tissue and an optimum wash with normal saline should be given. An extensive debridement and an early administration of broad-spectrum antibiotics (covering both aerobic and anaerobic organisms) are the most important measures to prevent wound infection [6,8]. A secondary or delayed primary wound closure should be considered in this injuries. Use and effectiveness of vacuum therapy devices has been widely studied in literature, showing benefits in severe and complicated wounds with extensive loss of soft tissue associated with local infections [15]. This therapy offers advantages such as wound drainage, angiogenesis stimulation, proteinase excretion, and decreased local and systemic bacterial load [16].

Conclusion

Impalement injuries are a rare and potentially lethal traumatic situation that needs a multidisciplinary team with coordinated approach as soon as possible to achieve favorable outcomes. Each case must be individualized for a proper management, but the most important measures are an extensive wound exposure, extraction under direct vision, adequate debridement, and broad-spectrum antibiotic coverage. Due to the high risk of wound infection, a close follow-up is needed.

References

1. Mattox KL, Moore EE, Feliciano DV (eds) (2012) Trauma, 7th edn. McGraw-Hill Education.
2. Ugoletti L, Zizzo M, Castro Ruiz C, Pavesi E, Biolchini F, et al. (2019). Gluteal, abdominal, and thoracic multiple impalement injuries. Medicine, 98: e15824.
3. Yadav J, Badkur DS. (2016) An unusual case of impalement injury, Med. Sci. Law 56: 213-216.
4. Mohan R, Ram DU, Baba YS, Shetty A, Bhandary S. (2011) Transabdominal impalement: absence of visceral or vascular injury a rare possibility, J. Emerg.Med. 41: 495-498.
5. Edwin F, Tettey M, Sereboe L, Aniteye E, Kotei D, et al. (2009) Frimpong-Boateng, Impalement injuries of the chest, Ghana Med. J. 43: 86-89.
6. Horowitz MD, Dove DB, Eismont FJ, Green BA. (1985) Impalement injuries. J Trauma 25: 914-916.
7. Oya S, Miyata K, Yuasa N, Takeuchi E, Goto Y, Miyake H, et al. (2013) Impalement injury to the left buttock with massive bleeding: A case report. Nagoya J Med Sci 75: 147-152.
8. Naito K, Obayashi O, Mogami A, Han C, Kaneko K. (2008) Impalement injury of the pelvis due to car brake pedal. Injury Extra 39: 11-13.
9. Udo IA, Eta O, Sokwa C, Etuknwa E. (2017) Impalement injury to the abdomen: Report of a case. Niger J Clin Pract 20: 1210-1212.
10. Berg RJ, Karamanos E, Inaba K, et al. (2014) The persistent diagnostic challenge of thoracoabdominal stab wounds. J Trauma Acute Care Surg 76: 418-423.
11. Williams N, Bulstrode C, O'Connell P. (2013) Bailey and Love's Short Practice of Surgery. Boca Raton: CRC Press.
12. Schellenberg M, Inaba K. (2018) Critical decisions in the management of thoracic trauma. Emerg Med Clin North Am 36: 135-147.
13. Biffl WL, Leppaniemi A. (2015) Management guidelines for penetrating abdominal trauma. World J Surg 39: 1373-1380.
14. Alani M, Mahmood S, El-Menyar A, Atique S, Al-Thani H, et al. (2017) An unusual case of transpelvic impalement injury: A case-report. International Journal of Surgery Case Reports, 41: 26-29.
15. Wongworawat MD, Schnall SB, Holtom PD, Moon C, Schiller F. (2003) Negative pressure dressings as an alternative technique for the treatment of infected wounds. Clin Orthop Relat Res. 414: 45-48.
16. Mouës CM, Vos MC, van den Bemd GJ, Stijnen T, Hovius SE. (2004) Bacterial load in relation to vacuum-assisted closure wound therapy: a prospective randomized trial. Wound Repair Regen. 12: 11-17.