

Multiple Thoracoabdominal Impalement Injuries

Omobolaji O. Ayandipo, MD;¹ David Irabor, MD, FWACS;¹ Oludolapo Afuwape, MD, FWACS;¹ Peter Adeoye, MD, FWACS;² Mudasir Salami, MD, FWACS²

1. Division of Gastrointestinal Surgery, Department of Surgery, University College Hospital, Ibadan, Nigeria
2. Division of Cardiothoracic Surgery, Department of Surgery, University College Hospital, Ibadan, Nigeria

Correspondence:

Omobolaji O. Ayandipo, MD
Department of Surgery
University College Hospital
PMB 5116
Ibadan, Nigeria
E-mail: yokebukola@yahoo.com

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CT: computed tomography

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Abstract

A 20-year-old male was impaled through the chest, abdomen, and right upper thigh by three 1.5 cm (0.59 in) diameter rods, each 2 m (6.56 ft) in length. The first rod entered below his right nipple, the second through the right hypochondrium, and the third through the right upper thigh. He was transported to the hospital with the rods in situ. This paper provides insight as to how these unusual injuries were managed in a limited-resource environment. Even in a developing country, the challenges posed by multiple impalement injuries can be managed successfully by rapid prehospital transfer, along with an adequate and coordinated hospital team effort.

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Case Report

Multiple thoracoabdominal impalement injuries are uncommon. To guarantee successful outcome, adequate and coordinated prehospital care with adequate resuscitation is vital. Multidisciplinary management is paramount, and there is often inadequate time for proper evaluation/resuscitation of the patients.

The bizarre presentation and successful surgical management of multiple major impalement injuries of the trunk, abdomen, and perineum are described, along with some principles of management to highlight the challenges of treating these injuries in a developing country.

A 20-year-old male was a middle seat passenger on a motorcycle. During a high-speed crash, he was thrown off the motorcycle and impaled on three rods protruding from a concrete slab lying side-up by a road construction site.

A welder cut the iron bars off the concrete slab without disturbing the rods. The patient was transported to the Casualty Department of University College Hospital within an hour of the accident.

On arrival, he was conscious, but in pain. The impaled iron bars were projecting both anteriorly and posteriorly. The most superior rod entered the right middle chest below the nipple and exited through the posterior right upper flank; the middle iron rod entered through the right hypochondrial region and exited through the posterior lumbar region; and the third penetrated through the right upper thigh and exited via the right subgluteal region (Figure 1). The patient had a pulse rate of 96/minute, blood pressure 100/60 mmHg with O₂ saturation of 90%, and was tachypneic. The patient's injuries are summarized in Table 1.

The patient and rods were supported at all times to avoid excessive movement; he was examined in the right lateral decubitus position. He had fluid/volume support via two large-bore peripheral venous accesses, and samples for laboratory investigations and cross-matching of blood were taken. Intravenous ceftriaxone at 1 g every 12 hours and metronidazole at 500 mg every eight hours were commenced. After five days of intravenous antibiotics, the patient received oral antibiotics for an additional five days.

A right apical, closed-tube thoracostomy was performed immediately in the Casualty Department, with drainage of about 200 ml of blood; the patient was then transferred to theater via the Radiology Department.

Intubation and skin preparation were done in the right lateral decubitus position, and the patient was laid supine just before the operation by gently pushing the posterior protruding parts of the rods anteriorly. Access to the peritoneal cavity was gained via a



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Figure 1. (Color online) The patient before surgery

Chest	Abdomen	Soft Tissue
Laceration of the diaphragm	Grade 3 liver laceration Perforation of the ascending colon Retroperitoneal hematoma	Multiple soft tissue entry and exit wounds

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Table 1. Summary of injuries

midline incision with findings of two diaphragmatic lacerations by the upper and middle rods, grade III hepatic damage, ascending colon perforation, and retroperitoneal hematoma. There was organic debris in the pleural and abdominal cavities. The rents in the diaphragm were enlarged by joining them together to properly access and irrigate the right hemithorax.

A right hemicolectomy with a primary ileo-colic anastomosis was performed to eliminate the need for a fecal diversion. A hepatorrhaphy, pleural cavity wash-out, and right phrenorrhaphy with debridement of the right thigh exit wound also were performed. The surgery lasted four hours; total intraoperative blood loss was approximately 800 ml.

The patient was electively ventilated in the Intensive Care Unit post-operatively, and pain was managed using a morphine-loaded infusion pump. He was discharged to the ward on the third day post-operatively, and discharged home on the 12th post-operative day. He has been seen once in the outpatient department and is stable.

Discussion

Thoracoabdominal impalement is one of the most severe types of penetrating trauma.¹ Multiple thoracoabdominal impalements

are rare.² Penetrating wounds of the thoracoabdominal regions necessitate surgical intervention as soon as the patient's general condition permits.

Elongated foreign objects of impalement still within the patient should not be removed outside the operating theater in order to prevent catastrophic hemorrhage on withdrawal. Delay in presentation usually has profound consequences with early onset of the lethal triad of emergency trauma medicine: hypothermia, acidosis and coagulopathy.^{3,4} Cautious and sensible extrication and rapid transportation were vital in contributing to the survival of this patient. The dictum that patients surviving thoracic impalement injuries are more likely to have sustained injury on the right side holds true in this case, as there is a lower risk of injury to the heart or great vessels on this side.⁵

Impalement wounds often are grossly contaminated by organic substances; in this case, sand and grass particles were found in the pleural cavity. These organic substances lead to empyema and abdominal abscesses if not properly debrided and managed with potent antibiotics and tetanus prophylaxis. Radiologic or other investigations should not delay definitive management. Plain x-rays were done en route to theater in order to confirm correct placement of the right apical closed thoracostomy tube drainage. A computed tomography (CT) scan may be required if readily available.

Conclusion

Even in a developing country, the challenges posed by multiple impalement injuries can be managed successfully by rapid pre-hospital transfer, along with an adequate and coordinated hospital team effort.

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