

Impalement injury involving both heart and lung: a rare case report

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Abstract: Mediastinal impalement is uncommon and often fatal injury. Patients with this injury have to undergo operative intervention regardless of the hemodynamic status or associated injury. Few cases have been reported in which the patient recovered without any sequelae.

We present a case of mediastinal impalement injury in which a metallic foreign body entered through the right 5th intercostal space just lateral to sternal border. The patient became unconscious and then stabilized hemodynamically and neurologically. The foreign body penetrated pleura, lung of right side and right atrium. Right anterolateral thoracotomy was done for its retrieval.

Follow-up of the patient was uneventful.

Key words: impalement injury, mediastinum, anterolateral thoracotomy

I. Introduction:

Impalement injuries result from the penetration of fixed elongated objects through the body. Projectile missile injuries resulting from firearms are generally excluded from the definition but stab wounds where the knife or sword is left in the victim are considered to be impalement injuries. Thoracic impalement injuries are rare in civilian practice probably because many of the patients who sustain these types of injuries die prior to presentation in a hospital. In overt impalement injuries, the impaling object is seen protruding from the victim's body. Consequently, the clinical problems are usually obvious and clinical decision-making usually uncomplicated. In concealed impalement injuries, the impaling object typically lodges within the body in its entirety and may not attract attention until the development of life-threatening complications. Clinical decision-making is often confounded by a tortuous path to diagnosis.

Commonly, the mechanism involved in the causation of impalement is one in which there is an impact between the human body and an immobile object. Accidental falls and road-traffic accidents involving collisions with a protruding object or patients ejected from automobiles who fall onto protruding objects typify this mechanism.

II. Case report:

A 20 year old male was admitted in emergency with alleged history of penetrating injury to anterior chest wall due to accidental entry of foreign body during machine work. Initially patient became unconscious but then regained consciousness. On examination there was entry wound on the anterior chest wall in right 5th intercostal space, 3 inches lateral to the sternum, X Ray chest (lateral view) showed foreign body in right side of chest.

Patient complained of breathlessness and chest pain but was hemodynamically stable. CECT thorax revealed right pleural effusion with haemorrhagic hyperdensity, metallic linear foreign body of size approximately 7.5 cm X 1.2mm in right middle lobe piercing pericardium and entering the right atrium above right inferior pulmonary vein suggestive of heart and lung injury.

Patient was shifted to operation theatre and right anterolateral thoracotomy was done. To prevent dislodgement of foreign body retractor was opened slowly and foreign body located. It was found to be piercing lung, pericardium and entering into the right atrium. Purse string sutures around the entry of foreign body in right atrium was taken to prevent the bleeding, foreign body was then removed from heart and purse string suture was tightened. It was then removed from pericardium and another purse string suture was taken in the lung to prevent air and blood leak. After foreign body retrieval postoperative period was uneventful and patient is doing well in follow up.

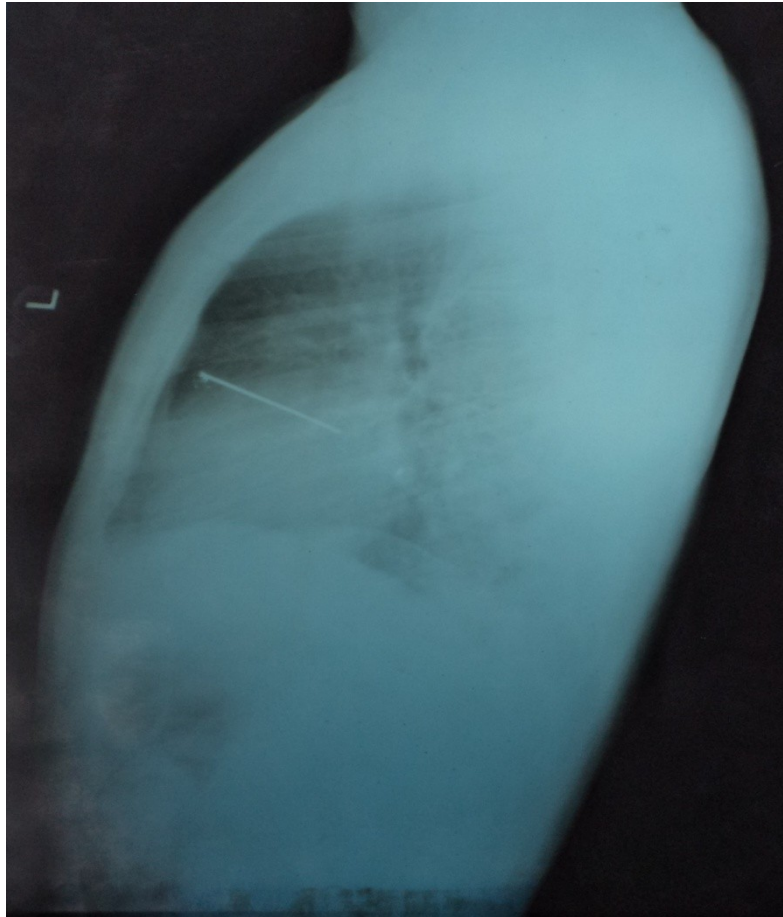


Fig. A: X Ray Chest lateral view shows a elongated radio opaque foreign body in mediastinum

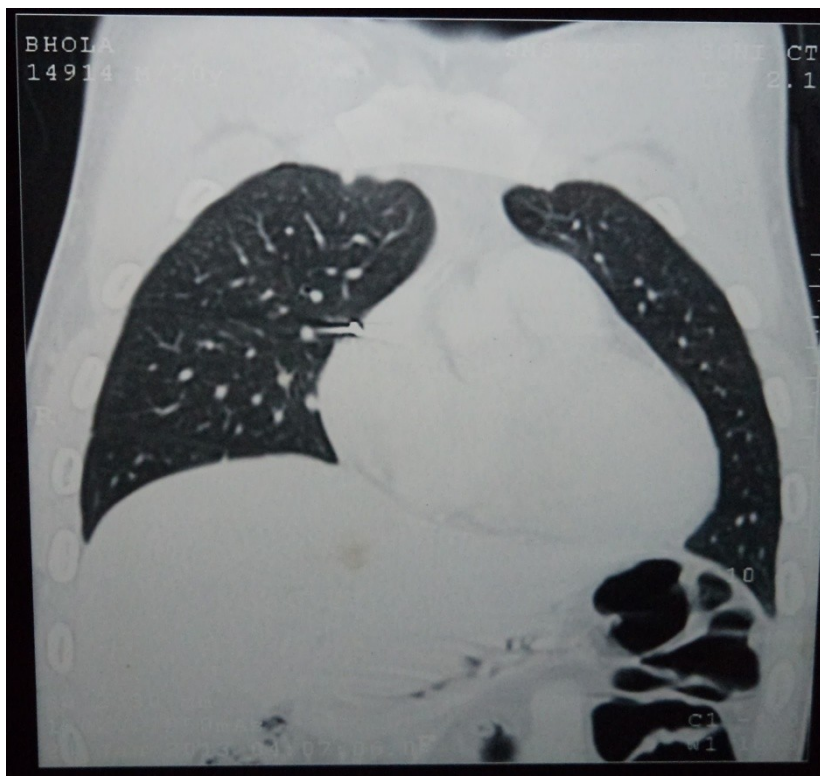


Fig B: CT SCAN Chest film showing a radio opaque foreign body in the region of right side of chest in right lung and abutting the right pericardium.

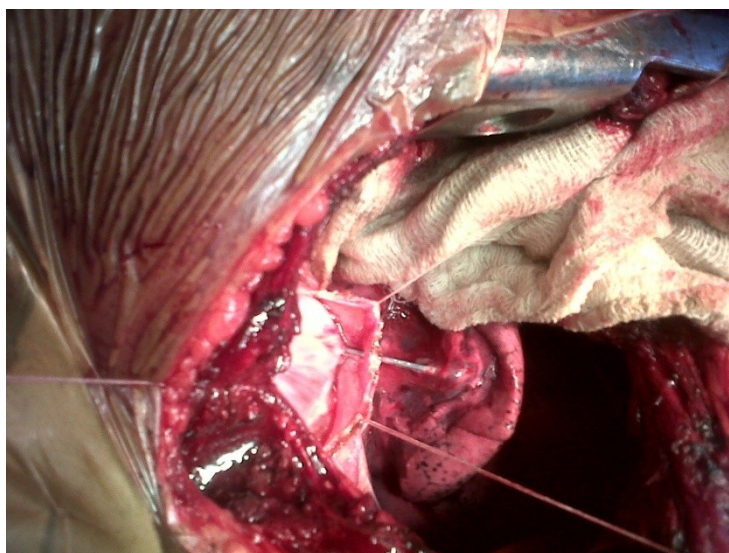


Fig C: Intraoperative picture revealing an elongated metallic foreign body penetrating right lung, pericardium and right atrium.

III. Discussion:

Thoracic impalement is an uncommon injury and one of the most severe types of penetrating chest injuries. Only a few cases have been reported in which the patient recuperated without any sequelae. Survival from impalement injuries to the heart is even rarer. Among all penetrating cardiac injuries, *right ventricle alone* is involved in 35% of the patients reaching the hospital. *Left ventricle alone* is involved in 25% of them. In 30% of the patients, more than one cardiac chamber is injured. These injuries can occur alone or in combination with other injuries to pleura, lung, mediastinal structures or abdominal organs. Cardiac injuries are called *complex when they involve coronary arteries, valves, septum or multiple chambers*. When a patient presents with a penetrating wound to the chest in a location and direction that could involve the heart, *it must be assumed that a penetrating wound of the heart exists*. *Most of the penetrating cardiac injuries result in cardiac tamponade, exsanguinating hemorrhage or malignant arrhythmias, all potentially fatal. Most patients present in shock, and require urgent resuscitation and access to surgery. In this case lung and right was injured with no features of tamponade.*

The cardinal rule of management is “*leave the impaling object in situ*” have been well described [1,2,4,5,7]. Generally, impalement injuries combine aspects of both blunt and penetrating trauma. The degree of damage depends on which organs are involved especially when the heart or great vessels are impaled; there is an extremely high mortality rate. To avoid major bleeding, the impaled object should be removed under direct vision in a well-controlled environment (an operating room). The operation should be begun as soon as the patient’s general condition is stable. For the proper treatment of an impalement injury of the chest, the following specific guidelines in the surgical management merit emphasis [1,2,3,4,5]

First of all, for the management of impalement injuries, it is essential to rapidly transport the victim to the hospital without attempting to remove the impacted foreign body. Instead, the object was carefully reduced to manageable dimensions in order to render transportation technically feasible. Usual trauma management principles should be followed, including airway control and fluid resuscitation. Sucking chest wound should be packed around it for further prevention of pneumothorax [6]

Although there is the need to proceed to the operating room with patients in unstable condition, that there should be a place for more selective and deliberate approach for exact nature and extent of injury in haemodynamically stable patients. Understanding the full extent of the injury is extremely important to plan the appropriate surgical approach. The impalement object must be extracted in the operating room under direct vision to prevent uncontrolled hemorrhage with cardiopulmonary bypass (CPB) on standby. Mechanical ventilator support is must for respiratory insufficiency, which is required in many patients.

Injured vital structures should be repaired primarily. All the necrotic tissues should be removed and wounds should be adequately debrided to avoid infection. But viable lung should not be sacrificed. Because the expanded lung is the best protection against empyema. Finally, the fragmented chest wall should be stabilized and properly secured and incision closed primarily by nonabsorbable sutures. Size of defect plays an important role in outcome. [1,2,3,4,5,6,7]

In this case the impalement object was sharp, was removed under direct vision with bypass stand by which was not needed.

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