

# Rectal Impalement Injury: from Cruelty to Salvage Endeavour

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## Rezumat

### *Traumatism prin tragere în țeapă: de la cruzime la salvarea vieții*

Traumatismele penetrante masive prin tragere în țeapă sunt foarte rare, complexe și cu ridicat potențial letal. Cu atât mai rare sunt asocierea în cadrul acestor traumatisme a unor leziuni interne pelvine, abdominale și toracice. Noi prezentăm cazul unui pacient în vârstă de 62 ani internat în urgență după o agresiune în cursul căreia un baston de lemn i-a fost introdus cu forță în rect. Examenul clinic a identificat extremitatea mai groasă, rotunjită a bastonului exteriorizându-se din canalul anal, iar extremitatea cealaltă, mai ascuțită palpabilă subtegumentar în fosa supraclaviculară dreaptă. Examenul computer-tomografic a demonstrat bastonul la nivelul rectului, retroperitoneului, mezocolonului ascendent și transvers, ficatului, diafragmului, plămânului drept și celei de-a 2-a coaste drepte. În urma intervenției unei echipe multidisciplinare, pacientul a supraviețuit. Deoarece astfel de cazuri sunt foarte rare în literatură, cunoașterea modului cum au fost tratate poate pregăti echipele de urgență pentru o acțiune rațională și eficientă în astfel de circumstanțe excepționale.

**Cuvinte cheie:** traumatism prin tragere în țeapă

## Abstract

Massive penetrating trauma by rectal impalement is a very rare form of injury, complicated and potentially lethal. It is even rarer for such injury to result in pelvic, abdominal and thoracic internal damages. We report the case of a 62 year-old man who was admitted in emergency after an aggression with a sharp wooden stake inserted forcibly into his rectum. Clinical examination revealed the blunt extremity of the stake outside the anus and the prominent sharp end reaching his right supraclavicular fossa. Radiographic examination showed the stake extending from the rectum to the right side of the neck. Surgery disclosed penetration through the rectum, retroperitoneum, large bowel mesentery, liver, diaphragm, right lung and right 2nd rib. The patient survived following management by a multidisciplinary surgical team. As similar reported cases are scarce, knowledge of the management of the few cases that have been successfully treated is likely to prepare the emergency teams to act rationally and efficiently in such exceptionally circumstances.

**Key words:** impalement, injury

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## Introduction

Despite a rare incidence, pelvic and thoraco-abdominal impalement is one of the most severe and impressive types of penetrating trauma, alongside a challenging and spectacular management and unpredictable outcome (1, 2). Throughout the mankind history this type of injury has been described as

an extreme practice of torture and execution during Middle Ages (3-5). Nowadays, impalement injuries are due to foreign bodies (solid and elongated objects) inserted into the rectum within homicidal, psychiatric or sexual acts. There are also accidental rectal injuries as result of a falling from a height onto a sharp object or collisions (6). Impalement injuries are often associated with vascular and visceral damage entailing significant morbidity and mortality (6-8). The management of these injuries involves specific challenges in pre-hospital care, transport and appropriate surgical strategies in the operating theatre.

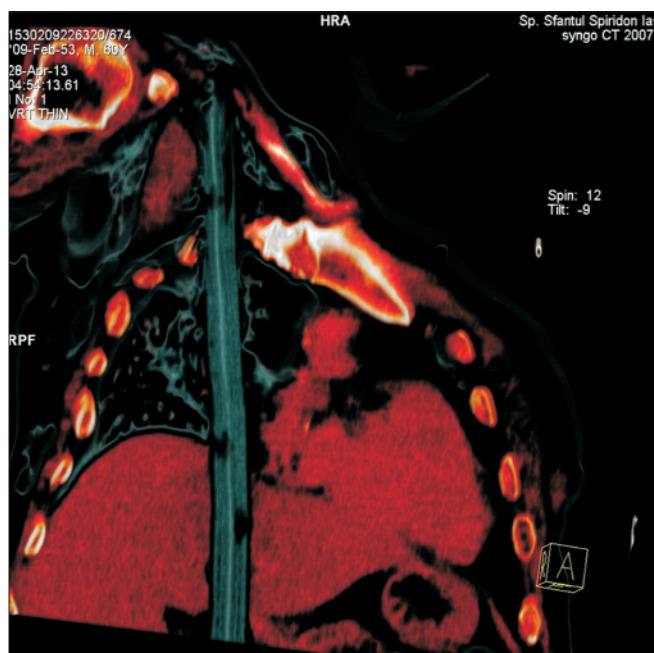
## Case report

A 62 year-old male, homeless, has been admitted in emergency to our Level I trauma center, 4 h after an assault with a wooden sharp stake (peanut tree) hammered forcibly into his rectum with criminal violence. That caused the stake to drive into his body till it finally appeared subcutaneously in the right supraclavicular fossa. The victim was rushed into Emergency Department in a knee-elbow position as the stake has been protruding out from his anus preventing him to lay flat. On admission, he was found spontaneously breathing, hemodynamic stable, with the chief complaint of chest and abdominal pain. The last 16 cm of a wooden stake about 3.5 cm in diameter were visible coming out the anal orifice (Fig. 1) and in the right supraclavicular fossa was palpable a hard, sharp lump under the skin, that was moved by gentle manipulation of the distal end of the stake. After trauma evaluation and assurance of his stability, CT scan was performed, revealing a slender foreign body extending from the rectum to the right side of the neck (Fig. 2-4).

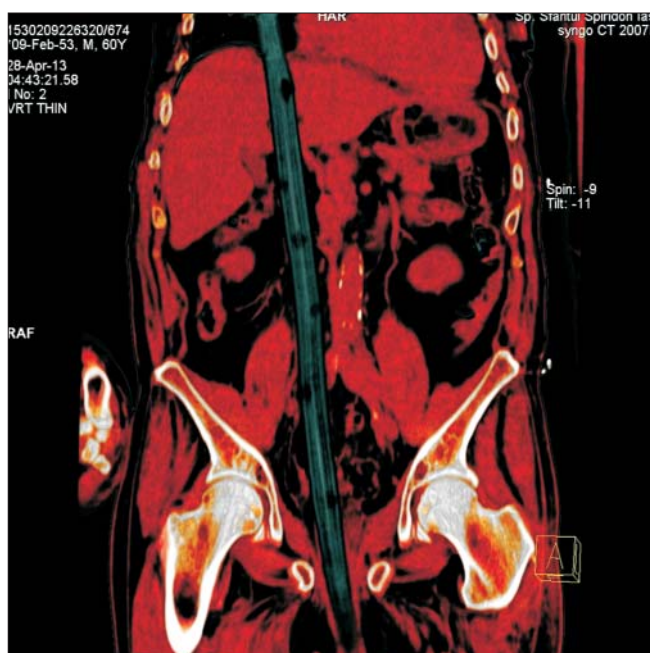


**Figure 1.** Preoperative aspect

Emergency midline laparotomy and right thoracotomy were performed under general anesthesia. The stake was found to have entered the abdomen with its splintered end by piercing through the subperitoneal rectum anteriorly between the prostate and the two seminal vesicles, bridging the bifurcation of the right common iliac artery. It pierced twice the right bowel Toldt fascia and mesentery, compromising the ascending colon and terminal ileum vasculature (Fig. 5), passed in front of the 1st duodenum, traversed the liver upwards through the umbilical fissure (Fig. 6) just adjacent to the left portal branch, left the liver and pierced the diaphragm anteriorly to the IVC and middle/left hepatic vein trunk (Fig. 7). In the thorax, the stake pierced twice right lung's middle lobe parenchyma, fractured the 2nd rib and laid with its distal splintered end below the right clavicle, sparing the subclavicular vessels and finally protruding in the subcutaneous tissue of the right supraclavicular fossa (Fig 2).



**Figure 2.** Thoracic CT scan reconstruction

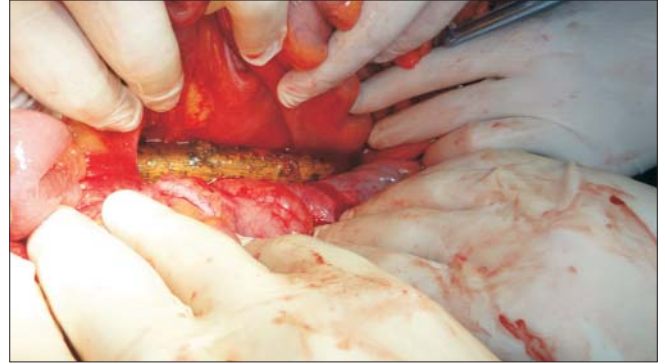


**Figure 3.** Abdominal CT scan reconstruction

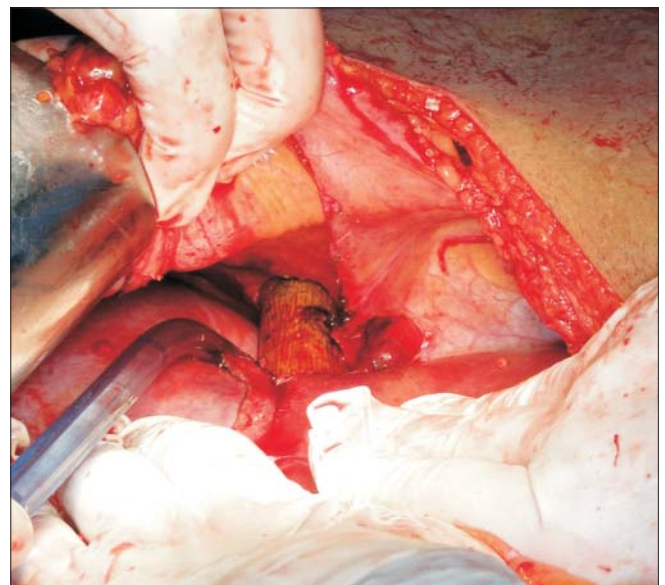




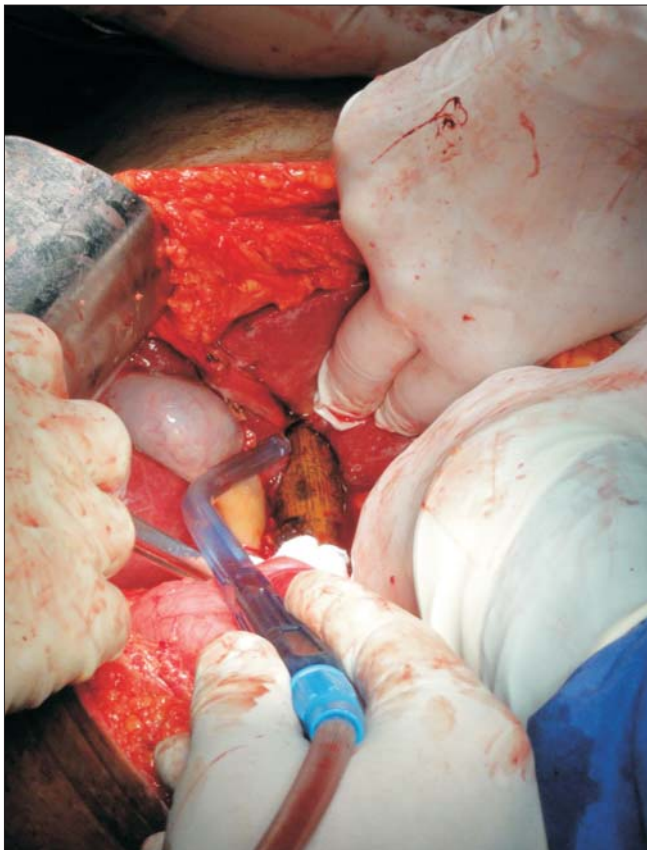
**Figure 4.** Abdominal CT scan reconstruction



**Figure 5.** Intraabdominal exploration



**Figure 7.** The wooden stake in the inter-hepato-diaphragmatic space



**Figure 6.** The wooden stake entering inferior face of the liver

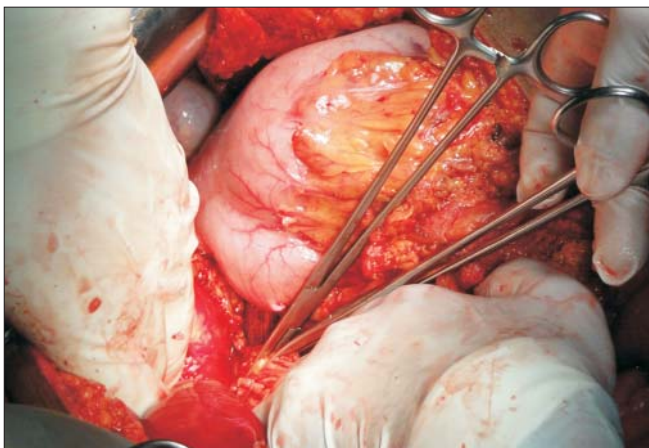
We exposed the stake's intraperitoneal portion, from the pelvis to the diaphragm by extensive division of the right Toldt fascia and division of the falciform ligament of the liver

prior to the suprahepatic IVC (Fig. 8,9). The stake was cut using an electric bone cutter causing as little motion as possible, protecting the underneath structures by a flexible retractor (Fig. 10, video).

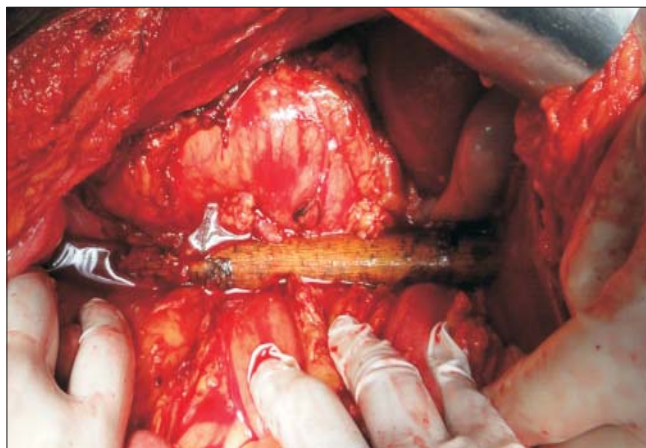
Direct sterile lubrication of the two pieces of wood was undertaken for easier slipping. The inferior segment (the one with the extremity outside the anus) was pushed retrograde from the abdomen protecting the right common iliac vessels, and slightly removed through the perineum pulling the strong suture preoperatively attached to the outer end (Fig. 11, 12). The superior segment was gradually withdrawn from the neck and thorax into the abdomen under vision, along the track it had entered, and removed (Fig. 13, 14). The wooden stake overall length was 67 cm. The pulmonary and diaphragmatic lesions have been sutured. The thoracotomy was closed after two pleural drains placement.

The hepatic injury required just a slight debridement, no blood, bile leakage or ischemic hepatic area being revealed. A slice of Tachosyl® was applied however throughout the hepatic injury.





**Figure 8.** The dissection in the right mesocolon area



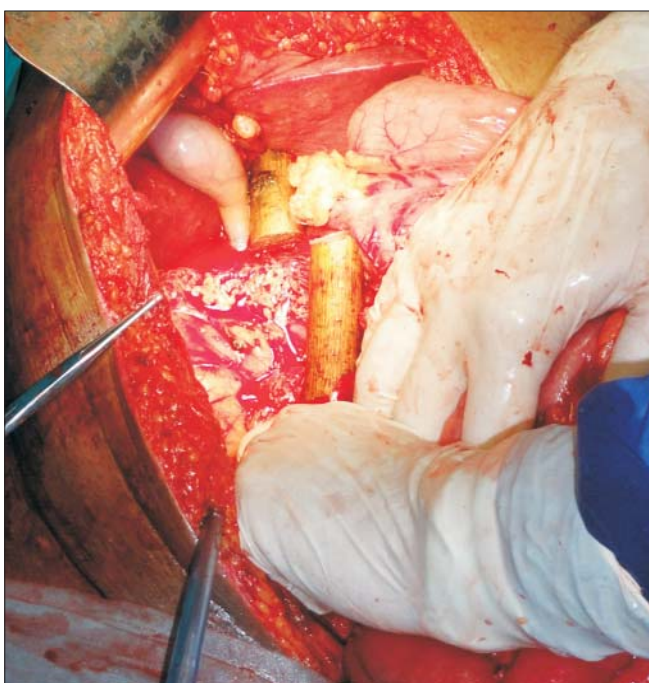
**Figure 9.** The aspect after finishing the dissection in the right mesocolon area



**Figure 10.** Cutting the wooden stake



**Figure 12.** The intermediate segment of the wooden stake



**Figure 11.** Wooden stake has been cut



**Figure 13.** Pulling out the superior segment of the wooden stake

The ascending colon and terminal ileum showed ischemic changes that required right hemicolectomy. The extraperitoneal rectal perforation was sutured in double layer and a lateral sigmoid colostomy was done. Total operative time was 3 hours and 35 minutes. Surgeons involved were two senior trauma surgeons, a thoracic surgeon and three surgery residents.

Postoperatively in the surgical intensive care unit, the patient experienced a biliary leakage of about 100 ml/day



**Figure 14.** Pulling out the superior segment of the wooden stake (almost completed)

*that gradually reduced and stopped twelve days after. A hospital-acquired pneumopathy progressed to an episode of severe sepsis, two weeks after surgery. With antibiotic treatment, aspiration bronchoscopy, his sepsis was resolved. A persistent right monoparesis was a result of the right brachial plexus contusion. The patient was discharged 45 days after his admission and at 3 months colostomy was reversed.*

## Discussion

Impalement injuries represent a particular subgroup of penetrating trauma. They occur when a solid and elongated object pierces (entering in their majority via anatomical orifices) and remains in the human body (6, 7). Impalement injury has been documented since the early beginnings of recorded history in ancient Egypt (9). Afterwards, the impalement became a medieval practice of torture (3,4). Nowadays it occurs during accidental falls or collisions as well as during homicidal, psychiatric or a myriad of sexually related activities (6). Classically, impalement injuries are divided into three types: type I injuries that occur when a person in motion bumps against an immobile object, type II when a mobile object collides with an immobile person and type III that results from an impact between a mobile object and a mobile person (6). There are currently no clear guidelines for the operative management of the extensive impalement injuries owing to the great diversity in impalement mechanisms with which patients may present and to the rare nature of pelvic and thoracoabdominal injuries. However, the existing literature and our experience allow a few conclusions and recommendations. While providing basic life support to minimize blood loss and avoid further injuries, the impaling object should be left in situ at the site of the primary accident and during patient transport. If required, truncation should be performed beyond the skin edges. Object features, trajectory, injured anatomical zone and intended incisions would dictate the appropriate disciplines to alert and to determine the patient's intraoperative position. Removal of the impaling object should be performed only in a tertiary trauma center, using a multimodality surgical approach, under the guidance of surgeons experienced in particular anatomical regions and systems

affected by the objects. In our case, two trauma surgeons and a thoracic surgeon were able to treat the multiple injuries the patient sustained. Such injuries can involve vital organs, compromising the normal physiology of respiration and circulation so stabilization of the patient may be a big challenge due to the interference of the object with these anatomical structures. The severity of organ injuries and the extent of blood loss determine the mortality risk. Hence, these traumas can be categorized as follows (5, 8): 1. Impalement with cardiovascular injury; 2. Impalement with injury of hollow organs (stomach, intestinal tract, bladder); 3. Impalement with injury of parenchymatous organs (spleen, liver, kidney); 4. Combined injuries. Patients sustaining type 1 trauma have the worst prognosis and, in general, death has been seen within 30 min of the accident. A low chance of survival until arrival to a trauma center is possible, provide the penetrating object is able to close the site of the damage sufficiently to arrest the lethal bleeding. This strengthens the necessity to let the stake in situ until the operative procedure. Injuries in groups 2 and 3 have a good chance of a positive outcome if patients can be admitted in a tertiary trauma center with competence of rapid diagnosis and availability of all surgical specialties. Besides common emergency diagnostics (e.g. chest radiography, abdominal ultrasound), a CT scan should be performed, to assess the complexity of trauma-induced injuries.

Removal of the impaling object under vision requires wide access via laparotomy and thoracotomy. A sterile lubricant can be useful. Organ injuries, particularly cardiac and vascular injuries (type 1) need to be repaired in order, to prevent acute bleeding and peripheral ischemia. Damage of hollow organs (type 2) will be treated by surgeons specialized for the respective anatomical region. The impaled object in our case traveled through the entire length of his torso yet did not share any major vessel or permanently damage any organ. The anatomic location of the stake was fortunate and minimal manipulation of the object was critical in order to preserve any potential tamponade effects and minimize blood loss and laceration.

Until November 2014, only 5 cases of rectal impalement with pelvic, abdominal and thoracic lesions have been found in English language literature (8-11). Interestingly, in all those 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. A similar trauma is described in Ivo Andric's novel "The Bridge on the Drina" as quoted by Moncure (8). The Romanian prince Vlad Basarab, nickname Dracula "The Impaler", used to execute enemies and outlaws by impalement (3-5). 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 postimpalement survival time (3).

In present times, our experience and data from literature prove that this type of impressive trauma is survivable and good emergency management could make the difference between life and death in those cases



## Conclusion

Impalement pelvic and thoraco-abdominal injuries lay down immediate life-saving endeavor, transfer to a tertiary trauma centre, appropriate intensive care, ready diagnosis and surgical intervention by a multidisciplinary team of abdominal, vascular and cardiothoracic surgeons. With these requirements provided, outcome is maximized, mortality is minimized and permanent/long-term damage is avoided.

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