



CHIRURGIE THORACIQUE/ THORACIC SURGERY

**CERVICO-THORACIC IMPALEMENT INJURY :
CASE REPORT AND LITERATURE REVIEW**

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ABSTRACT

Impalement injury especially of the cervico-thoracic region of the body is very rare. It is a very significant injury and usually require special consideration in its management. We report a 50 year old man who fell from palm wine tree and sustained cervico-thoracic impalement of a branch of tree which carried a piece of plastic bag material such that the branch of the tree and the plastic bag were driven into him. He was successfully managed in a hospital with only basic facilities. Important peculiarities on the management of this rare form of severe trauma especially in Africa is discussed. Also shown is the special occupational hazard and problem of poverty among rural farmers Nigeria.

Key words: Cervico-thoracic, Impalement, Injury.

RÉSUMÉ

La blessure interne, spécialement celle de la région cervico-thoracique du corps est très rare. Cela demande habituellement une considération spéciale pour la gérer. On a enregistré un vieil homme de 50 ans qui est tombé d'un arbre qui portait un morceau d'un sac en plastique de sorte que la branche de l'arbre et le sac en plastique sont entrés dans lui. Il a été soigné dans un hôpital qui n'avait que les facilités de base. Les particularités importantes sur la gestion de cette forme rare de traumatisme spécialement en Afrique sont mentionnées et discutées ainsi que les métiers à risque et le problème de la pauvreté parmi les agriculteurs ruraux au Nigeria.

Mots-clés: Cervico-Thoracique, Empalement, Blessure.

INTRODUCTION

Impalement injury refers to a special class of penetrating injuries where piercing object of significant dimension remains sticking out from the patient. Patient may be moved with the object. Transfixing injury refers to situations where the patients remain fixed to immobile structure e.g. fence post. These groups of injury are very severe especially when it involves the cervical and thoracic regions of the body due to compact arrangement of vital structures in such regions.

CASE REPORT

Mr. E.U.M, a 50 year old palm wine taper fell from a tall palm tree while trying to harvest palm wine because his climbing robe snapped. He landed on a cut branch of tree on the muddy floor which pierced his right posterior triangle of the neck and traversed the posterior chest wall to point medial to the medio-inferior border of the right scapular. (Figure I). The impaling stick carried with it the sleeve of a plastic bag which the taper hung on the neck such that the stick and the plastic bag were driven into his neck and chest. (figure II).

Despite the frightening nature of the injury, he managed to drag himself home and was subsequently brought by his wife about six hours after the incidence to the casualty unit of the University of Calabar Teaching Hospital, Calabar, Nigeria at night. Though he was covered with mud, he was conscious and the cardiovascular system was stable. His pulse rate was 86 per minute, regular and of full volume. His blood pressure was 130/80 mmHg, respiratory rate was 26 cycles per minute, temperature was 37.4° Celsius and PaSO₂ of 96% on room air. There was no significant blood loss and other organs were normal except old cataract and a squint involving the right eye.

He was received in a wheel chair as he could not lie down on bed because of the projecting branch of tree from his neck (fig. 1). He was given a good bath, intravenous fluids antibiotics and analgesics. Chest x-ray, full blood count, urea, electrolyte and creatinine and urinalysis were done. A plain postero-anterior and lateral chest films showed soft tissue shadow representing the foreign body from the neck to the posterior chest wall grazing the posterior right pleura. Extensive lung contusion and dense patchy opacities of the entire right lung fields were noted on the x-ray. All other tests were normal. Blood was grouped and cross-matched for him. All investigations and drugs were sponsored by the attending unit to avoid delay in his management as the patient did not have any funds for his treatment.



Fig. 1 : Patient before surgery after trimming the tree branch and the bag.



Fig. 2 : The impaling stick and bag after extraction.

He had emergency right postero-lateral thoracotomy within six hours of arrival in the Hospital. Impalement objects were removed after full access had been gained into the thoracic cavity. Severe lung contusion had occurred from blunt impact of the fall. There was moderate haemothorax

(about 350 ml) and dense fibrinoid exudates involving the entire pleural cavity with tendency to fibrous encasement of the lung. There was no serious neurovascular injury and no rib fracture. Adhesiolysis and release of the lung was done. Lavage and underwater-sealed thoracostomy tube drainage was instituted. Debridement, irrigation lavage and drainage of the impalement tract were carried out and the wound was left open for dressing. Minimum intravenous fluid requirement was given to prevent worsening pulmonary edema which followed lung contusion. He was placed on ceftriazone, metronidazole, gentamicin and analgesics. Antitetanus prophylaxis and haematinics and other supportive care were given. He was initially managed in the intensive care unit for two days before being transferred to the ward, and subsequently recovered without complications. Complete healing took place within three weeks. Patient however absconded in order to avoid payment of hospital bill.

DISCUSSION

Major impalement injuries of the thoracic region are uncommon and reports in literature are infrequent¹⁻¹². They present as dramatic and frightening cases. Our patient attracted a crowd in the hospital. Literature search shows mostly cases published as case reports as individual surgeons do not see many cases in their series. Most of such cases have extremely high mortality especially when vital mediastinal structures are involved. Mortality occurs at site of injury or within few minutes to hours after. Common cause of immediate death include: major cardiac or vascular penetration, airway obstruction, tension pneumothorax, massive haemothorax, flail chest (representing major chest wall disruption), cardiac tamponade and massive exsanguinating haemorrhage. Parenchymal injuries to the lung, liver, spleen or gut are compatible with survival with expert management. Damage to major vessels and nerves in the thoracic inlet may accompany cervical injury especially zone I (from clavicle to cricoid cartilage). Other associated injuries should be carefully evaluated and managed as they may contribute to mortality. In the case presented, there was lung contusion from blunt deceleration chest trauma. Stable cases that last up to few hours could be successfully salvaged when they present in the hospital. Majority of impalement or transfixing injuries are low velocity in nature so that the outcome depends on the size of the offending instrument and the anatomical structures involved.

Etiologically, these injuries may broadly be classified into three categories: (a) Road traffic accidents: Results from motor vehicle occupant or cyclist being thrown out to collide with projectiles such as fence post, or tree stump or metal. (b) Aggression: This may follow low velocity implement including knife, spear, or arrow. In combat situations, projectiles traveling on speed may meet a stationary victim resulting in high velocity impacts. Domestic violence and industrial assaults with electric drill, dagger, furniture parts, glass or machinery have been reported.^{4,11,12}. Falls from a height: This, as shown in our patient could result in transfixion or impalement injury. Victims commonly land on projectiles, stump of trees, sticks, fence post, building materials etc. This is a specific occupational hazard of many African rural dwellers who engage in palm wine tapping or

palm fruit and coconut harvesting. Sport injuries especially victims being thrown out from horse riding and other high velocity or motorized sports.

Transfixion often involves more than one body cavity, usually chest and abdomen, neck and chest as in this case, both thoracic cavities. Apart from chest wall and visceral injury, contamination by clothes, soil, debris, together with bacteria such as Clostridia, Streptococci and Staphylococci are common.

At the site of injury objects should be manipulated as little as possible in order to prevent sudden massive haemorrhage since impaling objects may tamponade damaged (traversed) blood vessels. No attempt should be made to remove the object at the site. However such objects may be shortened or detached from massive immobile unit to enhance patient transport. This may require heavy cutting equipment to cut through wooden fence or metal. Foot and Naidoo¹³ reported an exceptional case where this rule was broken to save the patient from fire explosion. Pre-operative bath was important as our patient was covered with mud, to reduce the chances of infection and enhance acceptability of patient for care. This may not be required in all cases. Grouping and x-matching should be done in anticipation of possible severe intra-operative haemorrhage. Resuscitation should follow basic principles of airway, breathing and circulation. When the patient is haemodynamically stable, plain radiographs, endoscopy and/or angiography could be done as indicated. Occasionally, the patient may be moved directly from ambulance to the operating theatre. Antibiotic prophylaxis is always required in this group of patients.

When the impaling object is long and traverses the cervico-thoracic region as in our case, induction of anaesthesia could be very challenging as proper supine positioning and neck extension for induction and intubation is difficult. This therefore requires the services of an experienced anaesthetist. Any disruption in the chest wall with open wound, haemothorax or pneumothorax should necessitate thoracostomy tube drainage under local anaesthesia before commencement of general anaesthesia. This will prevent sudden lung collapse during induction of general anaesthesia. Pre-operative pleural drainage was not indicated in our index patient.

Indication for thoracotomy in our patient was the possibility of gross pleural contamination and possible massive intrapleural bleeding after removal of the foreign body. Preoperatively, it was not certain whether the impaling object had traversed the pleural cavity or not. Thoracotomy was therefore part of the caution, especially in the absence of preoperative CT scan which should give a definitive anatomical diagnosis. Thoracotomy was to enable us effectively handle major intrathoracic haemorrhage if it occurred and toilet the pleural cavity. This turned out to be a very necessary procedure as it also allowed extensive adhesiolysis to be carried out which otherwise could have resulted in severe fibrothorax in the future. We therefore recommend thoracotomy in similar circumstances especially in the absence of thoracoscopic facilities and CT scan. Median sternotomy should be preferred for better access to the mediastinum in circumstances where the impaling object traverses both sides of the chest. Sterno-laparotomy or thoraco-abdominal incision may be required to repair

associated abdominal injury. In extensive chest wall mutilation, the plastic surgeon should be involved.

No matter the grotesque nature of chest impalement or transfixation injuries, the prognosis depends so much on the degree of damage to vital structures. Even very frightening injuries may end up with good outcome when appropriate assessment, resuscitation, investigation and surgical principles are promptly and properly employed in the management. An emergency fund for this group of patients could enhance prompt treatment.

In Africa and West Africa in particular, an important major contribution to morbidity and mortality is poverty. Patients may hesitate to go to hospital empty handed, inaccessible health facility distribution, non-existent medical insurance or policies with inadequate coverage of the poor unemployed rural dwellers who commonly present with these injuries, absence of efficient blood bank service that can promptly provide blood for massive blood transfusion in catastrophic emergencies. Many patients depend on the good will of medical personnel to survive as was the case in our patient.

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