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Survival following an impalement injury through the perineum in association with high voltage electrical burns: A case report

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ABSTRACT

We reported a case of a 30-year-old man who reportedly sustained electrical burns and fell from a high voltage electric pole about 50 meter high onto a metal that caused impalement injury. In addition, he sustained full-thickness burns of the right upper limb (7%), the right hemithorax, the perineum (sparing the penis), the anterior abdominal wall and the lateral aspect of both thighs. There was 43% burned surface area in total. Radiographic examination revealed a slender curved object extending from his perineum into the pelvis. The management of this case was a challenging one which was described in this article.

1. Introduction

Impalement injury describes a subset of injuries which occurs when an object pierces and remains in the human body. These penetrating injuries are associated with high morbidity and mortality depending on the organ affected as well as the time to access specialized care[1,2].

Various mechanisms leading to impalement injury have been described. These include landing on a sharp object after falling from a height and homicidal, psychiatric and sexual acts[3]. The index case describes an impalement injury occurring from a fall from height after electrocution.

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2. Case report

2.1. Presentation and management

A 30-year-old electrical technician was apparently electrocuted whilst working on a high voltage electric pole of a height of about 50 meters. He landed with his buttocks on cut pieces of metal at the worksite. One of such metals penetrated into his perineum, which was cut short by co-workers and ambulance personnel prior to transporting to the tertiary centre.

Upon arrival at the Accident and Emergency Center of the Komfo Anokye Teaching Hospital, the patient was conscious, alert and hemodynamically stable with full thickness burns of the right upper limb (7%), the right hemithorax, the perineum (sparing the penis), the anterior abdominal walls and lateral aspect of both thighs. There was totalling 43% burned surface area. There was a metallic object sticking out from the perineum. The scrotum was swollen and tender. There was no blood seen at the urethral meatus. Chest compression tenderness was negative and chest findings were unremarkable. Abdominal findings were unremarkable. On digital rectal examination, the ampulla was empty and the examining finger

was not stained with blood. There was no deformity of any limb (Figure 1).

Figure 1. Photograph showing the object in the perineum with burns.

This evaluation was done via the advanced trauma life support protocol. Focused assessment with sonography for trauma done was negative. The intravenous fluids were continued, and he was put on analgesics, intravenous antibiotics with continuous monitoring of his vital signs. The burn wounds were irrigated and dressed. It was observed that urethral catheterization failed due to some resistance encountered in the posterior urethra. Upon assurance of his stability, radiographic images (plain X-rays) were obtained (Figure 2). The patient was then sent to the operating room for formal exploration and operative management of his injuries.

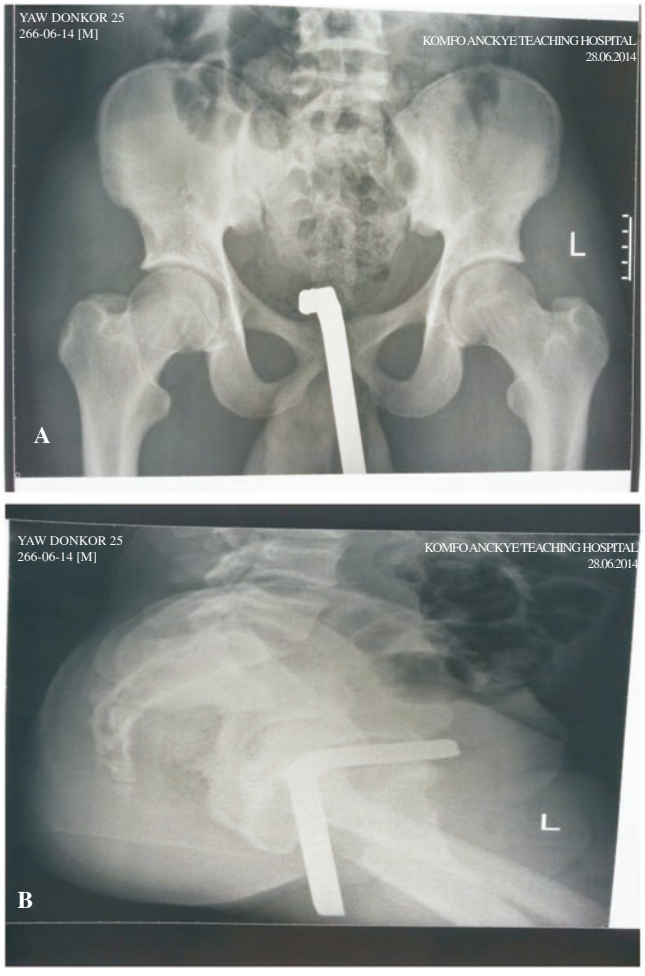

Figure 2. Plain radiographs (A and B) showing the curved end of the object extending into the pelvis.

On exploration through a midline incision, it was discovered that the impaling object was logged in the bladder neck. There was no injury to the rectum or small bowels. A urethral catheter was repassed and confirmed to be lodged around the bladder neck. To remove the offending object, a vesicotomy was done and the metal piece was pulled antegrade through the vesicostomy (Figure 3). The overall length of the metal rod was 17.5 cm (Figure 4). The urethral catheter was successfully repassed. Even though there was no gastrointestinal tract injury, a colostomy was done to divert faeces so that the perineal injury would heal after toileting, drainage and primary closure. The eschar formed on the burned right arm was removed. Fasciotomy was also done to minimise the compartment on the left upper limb. Personnel included anaesthetists, general surgeons, a urologist, plastic surgeons and surgery residents.

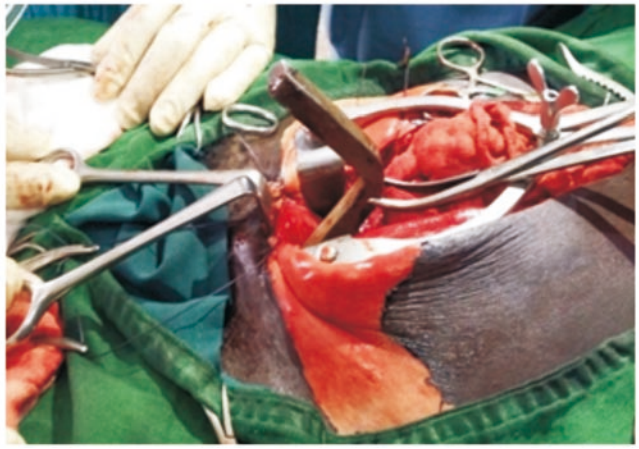

Figure 3. Photograph of object being removed through laparotomy.

Figure 4. Photograph of the removed object.

2.2. Post-operative management and complications

Postoperatively, the patient was nursed in the intensive care unit on intravenous fluids, analgesics, antibiotics as well as parenteral nutrition. The urethra catheter was kept insitu for two weeks. At three weeks postoperatively, his stay was further complicated by infection of the burned area. Serial debridement and skin grafting was carried out over a period of four weeks. Seven weeks after his admission, the patient was discharged home in good functional status and followed upon outpatient basis by the various specialties. After one year, closure of the colostomy was done for him when the perineal wound had completely healed after some recurrent breakdown of the wound (Figure 5).

Figure 5. Final state of the patient.

3. Discussion

Impalement injuries are penetrating traumatic injuries caused by solid objects entering the body. Various mechanisms for this type of injury have been described which include fall from height, motor vehicular accidents as well as violent actions[4]. The case under consideration had the patient falling from a height after electrocution. The morbidity and mortality associated with this type of injury are high and dependent on a lot of factors. The greatest determinant is the type of organ injured by the object.

It is a key to keep the object insitu at the scene of the accident and in transiting to a specialised centre to prevent further damage and exsanguination by pulling it out[3]. A tamponade effect is thus achieved by leaving the object insitu till formal surgical exploration can be done at a specialised centre. This is exemplified in this case and also worth noting that it is the truncation of the object to aid transport to the hospital.

The varying nature of the presentation of these impalement injuries accounts for the lack of clear operative guidelines. The key is multidisciplinary approach based on initial assessment of the possible injuries for successful outcome[2,3]. The index case had a multidisciplinary team to deal with the problems of the patient. In addition to this, resuscitation and use of the advanced trauma life support protocol are essential for good outcomes.

Imaging to assess the extent of injury and to aid planning of the surgery to improve outcome and reduce operating time by the element of surprise is a crucial part in the management of these patients[3,5].

Removal of the object should be carried out under direct vision, followed by the necessary repair based on the organ affected. In our case, though no rectal injury was present, the vast nature of the perineal burn wounds required faecal diversion via colostomy to aid healing[5].

Diverting colostomy has been the standard for anorectal injuries and bowel injuries[6-9]. The use of suprapubic catheterization for bladder repair is shifting more towards transurethral route even in the face of intraperitoneal bladder injury[10-12]. Our patient was managed with a transurethral catheter successfully.

Closure of colostomy has no conclusive time frame. Some studies indicated as early as two weeks in a stable patient without sepsis[5]. The time for closure may be largely dependent on the nature of the injury. In the index case, it took a year for the perineal wound to heal completely after recurrent breakdowns leading a delay in the closure of the stoma.

4. Conclusion

The patient survived from a potentially lethal injury. However, following the recommended principles of primary site management of this type of injury and using multidisciplinary approach culminated in the successful management of this patient. In the case described, the patient was very fortunate that the anatomic location of the object did not cause enormous damage. Modern medicine is still limited in terms of the numbers of such serious cases and the complexity of the few cases that present a great challenge with paucity of clear cut guidelines for their management. The way out is a multidisciplinary approach for a successful outcome as exemplified in this report.

Conflict of interest statement

The authors report no conflict of interest.

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