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DELAYED ILEAL PERFORATION AND ENTEROCUTANEOUS FISTULA FOLLOWING ELECTRICAL BURN INJURY: A RARE CASE REPORT

General Surgery

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ABSTRACT

Electrical burn injuries are associated with considerable morbidity due to their ability to cause deep tissue and visceral damage that may not be immediately evident. Gastrointestinal perforation secondary to electrocution is uncommon and is frequently characterized by delayed clinical presentation, complicating diagnosis. We report the case of a 30-year-old male who sustained an electrical burn involving the left upper limb and abdominal wall, subsequently developing delayed ileal perforation with peritonitis and an enterocutaneous fistula. Emergency exploratory laparotomy with primary repair of the ileal perforation and proximal diversion loop ileostomy was performed. Timely surgical intervention resulted in a favourable clinical outcome. This case emphasizes the importance of careful evaluation and close observation for intra-abdominal injury in patients with electrical burns, irrespective of the voltage involved.

KEYWORDS

Electrical Injury, Ileal Perforation, Enterocutaneous Fistula, Peritonitis, Ileostomy

INTRODUCTION

Electrical injuries constitute a distinctive form of trauma in which the magnitude of internal tissue damage may be disproportionate to the extent of external burn injury. Based on voltage exposure, electrical injuries are generally categorized as low-voltage (<1000 V) or high-voltage (>1000 V) injuries [1]. Tissue injury occurs primarily due to conversion of electrical energy into thermal energy as current traverses the body, resulting in coagulative necrosis and progressive ischemic damage [2].

Visceral involvement following electrical burns is rare and is more frequently reported in high-voltage injuries, particularly when the current pathway includes the abdomen [3]. However, delayed perforation of the gastrointestinal tract may also occur after low-voltage exposure due to evolving transmural necrosis. Because initial symptoms may be subtle or absent, diagnosis is often delayed, increasing the risk of serious complications. We describe a rare case of delayed ileal perforation with enterocutaneous fistula following an electrical burn injury and discuss the diagnostic challenges and management considerations.

Case Report

A 30-year-old male presented with a history of accidental electrocution sustained while working on an electrical power pole one week back. The injury occurred following direct contact with an electrical cable, after which the patient developed burn injuries involving the left hand, wrist, and abdominal wall.

Figure 1:Entry Wound Left Hand and Wrist

Figure 2: Exit Wound [Enterocutaneous Fistula]

Clinical examination revealed second and third-degree burns over the left hand and wrist [Figure 1]. The patient complained of abdominal pain, progressive abdominal distension, and failure to pass stool and flatus. A necrotic area was noted over the right lower abdominal wall, associated with discharge suggestive of an enterocutaneous fistula [Figure 2]. The entry wound was identified over the left hand and wrist, while the exit wound was located over the right lower abdomen. Sensory loss and delayed capillary refill were noted in the left hand. The patient was dehydrated, with a pulse rate of 100 beats per minute.

Laboratory investigations showed a hemoglobin level of 10.4 g/dL and a total leukocyte count of 24,000/mm^3. Serum electrolytes, liver function tests, and pancreatic enzymes were within normal limits. Electrocardiography did not reveal any abnormalities. An erect chest radiograph demonstrated free gas under both domes of the diaphragm, consistent with hollow viscus perforation.[Figure 3]

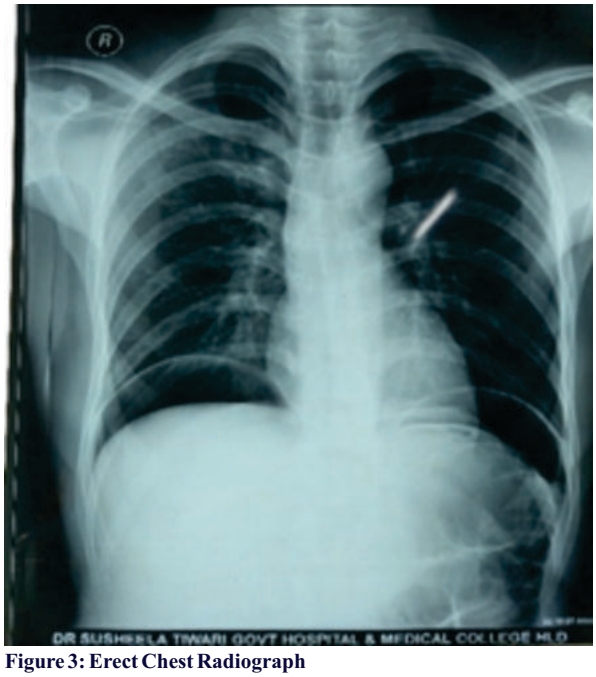

Figure 3: Erect Chest Radiograph

Based on clinical findings and imaging, a diagnosis of bowel perforation with generalized peritonitis secondary to electrical injury was established.

Surgical Management

Following appropriate resuscitation, the patient underwent emergency exploratory laparotomy. Approximately 500 mL of bilious fluid with fibrinous exudates was present within the peritoneal cavity. Exploration revealed a solitary perforation measuring approximately 2.0 × 1.5 cm on the antimesenteric border of the distal ileum, located about 20 cm proximal to the ileocecal junction. [Figure 4]

Figure 4: Terminal Ileal Perforation

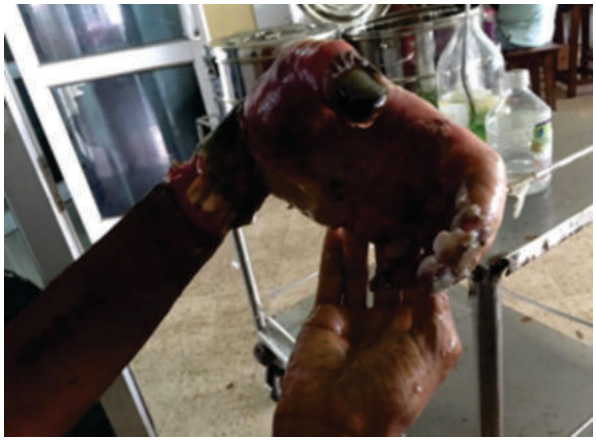

Figure 5: Follow up Condition of Left Hand

Thorough peritoneal lavage done and perforation margins were refreshed, and primary repair was performed with 3-0 vicryl. In view of significant peritoneal contamination and concerns regarding bowel integrity, a diversion loop ileostomy was created approximately 50 cm proximal to the perforation site. 30 Fr Pelvic drain was placed. Necrotic abdominal wall tissue was debrided up to the muscle layer, and the rectus sheath defect was repaired primarily.

A fasciotomy was performed for the burn injury involving the left wrist. Despite initial intervention, the patient subsequently developed complete sensory loss, fixed flexion deformity, and gangrenous changes affecting the fingers and dorsum of the left hand [Figure 5], necessitating a left below-elbow amputation later on.

The postoperative course was uneventful, and the patient was discharged on the tenth postoperative day. At discharge, the abdominal wall burn had healed satisfactorily. Follow-up evaluation revealed good clinical recovery.

DISCUSSION

Electrical burn injuries account for approximately 5% of burn-related hospital admissions and are associated with disproportionately high rates of morbidity [5]. Unlike conventional thermal burns, electrical injuries frequently produce deep tissue damage with relatively limited cutaneous involvement. As electrical current passes through body tissues, thermal energy is generated in accordance with Joule's law, resulting in protein denaturation and irreversible cellular injury [6].

Tissue resistance to electrical current varies, with nerves and blood vessels offering minimal resistance, while fat and bone provide higher resistance. Consequently, electrical current tends to follow neurovascular pathways, enabling it to reach deep visceral structures with minimal surface injury [7]. This phenomenon explains the delayed presentation of bowel perforation, as progressive ischemia may culminate in transmural necrosis days after the initial insult.

Although abdominal visceral injuries are more frequently associated with high-voltage electrical exposure, low-voltage injuries can also produce significant internal damage depending on contact duration, current density, and the anatomical course of the electrical pathway. In the present case, the proximity of the affected ileal segment to the abdominal exit wound likely contributed to localized bowel necrosis and subsequent perforation.

Reports of small bowel perforation or enterocutaneous fistula following electrical injury are scarce in the literature [3,4,8], highlighting the rarity of this complication. The small intestine and colon are the most commonly involved organs when visceral injury occurs. Surgical management should be tailored depending upon the extent of the perforation, anatomical site and presence of diffuse or localized peritonitis, the treatment varies from primary closure with or without protective colostomy to exteriorization and the Hartmann operation.[9] In cases with extensive contamination, diversion procedures are preferable to reduce postoperative morbidity. Accordingly, primary repair with diversion loop ileostomy was performed in our patient.

CONCLUSION

Electrical burn injuries have the potential to cause concealed and

delayed intra-abdominal visceral damage, even following low-voltage exposure. Clinicians should maintain a high index of suspicion for gastrointestinal injury in patients with abdominal wall burns and corresponding entry-exit wounds. Early recognition, close monitoring, and prompt surgical intervention are essential to minimize complications and improve patient outcomes.

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