

Case Report

Electrical burns of the abdomen

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ABSTRACT

A 35-year-old male farmer came in contact with 11,000 volts high tension electric wire and sustained full thickness burn wounds over scapula, upper limb and anterior abdominal wall along with perforation of the intestine. Patient was initially managed conservatively in general surgery ward and was referred to us after 3 days with necrosis of the burned skin and muscles over the shoulder and abdomen. Patient was initially managed conservatively and then thorough debridement of the necrotic skin over the left shoulder and upper arm was done and the area was split skin grafted. Patient developed enterocutaneous fistula, which healed over a period of 8 weeks. The granulating wound over the abdomen was also skin grafted and patient was discharged after 18 days. About 4 months, after the discharge patient presented with ventral hernia. Repair of ventral hernia by synthetic mesh application and reconstruction of the abdominal wall with a free tensor fascia lata flap was done over the mesh, but the flap failed. Then after debridement two random pattern transposition skin flaps, one from the right upper and another from the left lower abdomen were transposed over the abdominal wound and donor area was skin grafted. Patient was discharged after 17 days.

KEY WORDS

Abdomen; electrical burns; flap; hernia; skin graft

INTRODUCTION

The destruction of human tissue by high voltage electrical burns is very severe. Visceral injury is possible when the abdominal wall is involved and early diagnosis and proper treatment of the injury are very important. This article presents the successful treatment of a patient with electrical burns of the abdomen complicated by bowel perforation and enterocutaneous

fistula. The diagnosis and management are discussed and the literature reviewed.

CASE REPORT

A 35-year-old male farmer came in contact with 11,000 volts high tension electric wire while irrigating his field. This patient was initially admitted to general surgery ward from main casualty for management as he was having open abdominal wound and was managed there for initial 3 days. He had full thickness burn wounds over the right scapula, right upper limb and anterior abdominal wall along with perforation of the intestine. There was prolapse of the intestinal loops through abdominal wound. Patient was referred to our plastic surgery unit after 3 days. He presented to us in septic shock with an abdominal drain in place. Details of the preliminary

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management were unavailable except mention of putting in catheter drain through the open abdominal wounds. There was necrosis of burned skin and muscles over the right shoulder and abdomen [Figure 1]. Patient was initially managed conservatively with intravenous fluids, parenteral nutrition, barrier dressing of the abdominal wound and culture specific antibiotics. Patient responded well to the conservative management and once he was stable, a thorough debridement of the necrotic skin over the right shoulder and upper arm was performed. The area was then split skin grafted. The patient developed enterocutaneous fistula, which healed over a period of 8 weeks. The wound over the abdomen was also covered with skin graft and patient was discharged after 18 days [Figure 2].

About 4 months after the discharge, the patient presented with ventral hernia and requested reconstruction of the abdominal wall. Repair of ventral hernia by synthetic

mesh application and reconstruction of the abdominal wall with flap cover was planned. Per-operatively the abdominal skin graft was separated from the peritoneum and the underlying omentum and an inlay composite mesh was applied to secure the abdominal wall [Figure 3]. The graft was not de epithelialised. It was carefully separated from the peritoneum over the bowels. No perforation occurred. A free tensor fascia lata flap was applied over the mesh, but the flap failed. Then after debridement two random pattern transposition skin flaps, one from the right upper and another from the left lower abdomen were transposed over the abdominal wound and donor area was skin grafted [Figure 4]. Patient was discharged after 17 days with advice to wear an abdominal binder. He is presently in follow-up, it has been 18 months since surgery and there is no ventral hernia and abdominal wall is flat and intact. Patient is satisfied with the results [Figures 5 and 6].



Figure 1: Open abdominal wound with surrounding necrotic tissue after electrical injury



Figure 2: Well-settled abdominal scar after skin grafting. Abdominal hernia may be appreciated



Figure 3: Hernia closed with mesh



Figure 4: Wound closed with transposition flaps and skin graft



Figure 5: Two months after the operation — front view



Figure 6: Two months after the operation — lateral view

DISCUSSION

The devastating effects of high voltage electrical injury are well-known to most burn units. Although these injuries constitute a small percentage of all burns, they are some of the most challenging to treat.^[1] High voltage electric contact burn injuries commonly involve the extremities as they are more liable to make contact with the live wires. Abdomen is affected rarely owing to its greater cross-sectional area and low electrical resistance, which tends to dissipate the electrical energy. Electrical injuries can damage the abdominal viscera without direct contact with the abdomen.^[2] Electrical burn injury with abdominal visceral damage has a high mortality because the early signs are not very severe and the clinical recognition is difficult.^[2,3] The assessment of depth and extent of electrical burns may be difficult initially because previously healthy muscles may necrose later if nutrient vessels thrombose due to thermal effect of electrical energy. The same problems may affect the visceral organs when the abdominal wall is involved. When perforation of the intestine is suspected based on abdominal signs and symptoms, laparotomy should be done as soon as possible. Most of the surgeons fear that the burn wounds of the abdominal wall will contaminate the abdominal cavity at the time of operation. However, studies have demonstrated that secondary infection of the abdominal cavity can often be avoided, provided abdominal wound is debrided radically, abdominal cavity washed thoroughly and systemic antibiotics started early. Immediate reconstruction of the chest and abdominal wall defect following high voltage electrical injury by use of various local flaps has been done in the past.^[4] Stone *et al.*^[5] reported the following principles for management of acute full-thickness losses of the abdominal wall:

1. Insertion of a synthetic prosthesis to bridge any sizable defect in the abdominal wall rather than closure under tension via a primarily mobilised flap;
2. Use of end bowel stomas rather than exteriorised loops for primary anastomosis in the face of active infection, significant contamination and/or massive contusion; and
3. Delay in final reconstruction until all intestinal vents and fistulas have been closed by prior operation.

The large wound left after the debridement requires coverage, but restoration of the abdominal wall function is equally important. The options available include skin grafts, pedicled and free flaps and closure with a prosthetic mesh.^[4] The skin graft is a simple method of coverage and can be done if the patient is not fit to withstand prolonged surgery. It was followed in our patient, but as expected patient developed ventral hernia and requested reconstruction of the abdominal wall later. Fascial support was provided by an inlay prolene and vicryl mesh and covered with local transposition flaps. We hypothesise that the early excision of the abdominal burn wounds minimised the invasion of infectious agents into the intraperitoneal cavity and prevented septic death of the patient despite patient developing enterocutaneous fistula in the very initial stages of his management.

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REFERENCES

1. Dega S, Gnaneswar SG, Rao PR, Ramani P, Krishna DM. Electrical burn injuries. Some unusual clinical situations and management. *Burns* 2007;33:653-65.

2. Miller FE, Peterson D, Miller J. Abdominal visceral perforation secondary to electrical injury: Case report and review of the literature. *Burns Incl Therm Inj* 1986;12:505-7.
3. Yang JY, Tsai YC, Noordhoff MS. Electrical burn with visceral injury. *Burns Incl Therm Inj* 1985;11:207-12.
4. Kumar P, Varma R. Immediate reconstruction of chest and abdominal wall defect following high voltage electrical injury. *Burns* 1994;20:557-9.
5. Stone HH, Fabian TC, Turkleson ML, Jurkiewicz MJ. Management of acute full-thickness losses of the abdominal wall. *Ann Surg* 1981;193:612-8.

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