Bilateral Upper Extremity Amputation Due to High-Voltage Electrical Injury: A Case Report

Presenting Author
Feargal Geraghty, PT, MD (PGY3), Burn & Reconstructive Centers of Florida, Kendall Medical Center, Miami, FL

Co-authors
Ana Aguilar, MD, Resident, Kendall Regional Medical Center, Miami, FL
Mathew Wolfers, MD, Resident, Cleveland Clinic Florida
Harris Mir, MD, Burn Center Kendall Regional Medical Center, Miami, FL

Disclosure Information
Author and Co-authors have no relevant financial relationships to declare.

Abstract
Introduction: In the United States, there are approximately 1000 deaths per year, as a result of electrical injuries. Of these, approximately 400 are due to high-voltage electrical injuries, and lightning causes 50 to 300. There are also at least 30,000 shock incidents per year which are non-fatal. Each year, approximately 5% of all burn unit admissions in the United States occur as a result of electrical injuries. [1] High voltage electrical injuries result in extensive deep tissue damage and are associated with significant morbidity and high mortality rates.

Methods: In this case presentation, we review the current literature on bilateral arm amputation as a result of a high voltage electric burn injury. We describe a 56-year-old man with high voltage electrical injury to the bilateral upper limbs that was complicated by full-thickness burns, and compartment syndrome. We describe the multidisciplinary approach to both assessment and management of an electrical burn patient. Furthermore, we illustrate the importance of open family and patient communication in short and long term management goals.

Results: In this case report, we report that despite this 56 year old male electric company worker who suffered a high voltage electrical injury (13,000 Volts), and that despite only sustaining 10% TBSA partial and full thickness burns to his bilateral upper extremities, he required multiple surgical interventions, including bilateral fasciotomies, serial debridement, and ultimately bilateral above-elbow amputations. Despite best medical efforts, both upper extremities could not be salvaged and the patient ended up requiring bilateral transhumeral amputations. Unfortunately, amputation is often an inevitable consequence of electrical burns, with the ratio of extremity loss still excessively high compared to other forms of burns. This is particularly true in high-voltage injuries, with the correlation between voltage and fasciotomy, amputation as well as mortality well-established in numerous studies. The decision to amputate may be very challenging, but to reduce morbidity and improve survival this should be performed early, if the extremity is clearly necrotic or septic. Centering discussion with patient, family and multidisciplinary team is essential to ensure best physical and psychosocial outcomes for the patient.

Conclusion: Although rare, electrical burns cause potentially devastating injuries. Multidisciplinary management is required to achieve optimal results for these patients, ideally with a team that includes an emergency department physician, radiologist, surgeon, trauma specialist, anesthesiologist and a burn specialist. Fasciotomy performed by most surgeons based primarily on clinical findings of compartment syndrome is generally accepted, as it reduces intra-compartmental pressure and restores perfusion to viable tissues. Nevertheless,
this does not necessarily result in limb salvage. In view of the aggressive nature of the procedure, it is probably wise to carefully select those patients who would benefit from early fasciotomy and those in whom early amputation might be more beneficial.

**Learning Objectives**
1. Describe how to assess and manage a electrical burn patient in the trauma bay
2. Understand the types of electrical injuries
3. Understand how to trend and manage burn victims based on labs

**References**


18. L. Ligen, Y. Hongming, L. Feng, Y. Huinan, H. Quan, F. Guang, Magnetic resonance imaging features of soft tissue and vascular injuries after high-voltage electrical burns and their clinical application, Injury 43 (9) (2012) 1445–1450