



AMPUTATION IN ELECTRIC BURN: A STUDY OF PREDISPOSING FACTORS AND PREVENTIVE MEASURES

General Surgery

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ABSTRACT

As the use of electricity and electric equipments is increasing, electric burn has become a cause of mortality and morbidity. Amputation of the upper or lower limb as a consequence of an electric burn has profound impact on a patient's life. A retrospective study was conducted on the electric burn amputee patients at Pacific Institute of Medical Sciences, Udaipur from August 2017 to July 2022 to identify the important risk factors leading to this devastating consequence. Our study concluded that 31-40 yrs age (57.5%), rural (77.5%), male (95%) and farmers (70%) were the groups at most risk. High voltage electric burn (92.5%), delayed fasciotomy (37.5%) and myonecrosis (65%) were the major predisposing factors associated with amputation. Education and awareness of safe use of electricity, early fasciotomy of appropriate candidates and aggressive management is the key to salvaging limb and improving outcome in electric burn patients.

KEYWORDS

Electric burn, Amputation, Fasciotomy

INTRODUCTION

Electric burn patients have been increasing since the increased utilization of electricity in households and factories. Out of all admitted patients for the treatment of electric burns, a substantial number undergo amputation of the upper or lower limbs. This increases morbidity in terms of socioeconomic and psychological aspects of patients' life.

OBJECTIVES

The objectives of this study were -

1. To identify the factors leading to amputation in patients of electric burn
2. To establish preventive measures to salvage the limbs due to electric burn.

MATERIAL AND METHOD

This study was conducted in the Department of General Surgery, Pacific Institute of Medical Sciences, Udaipur from August 2017 to July 2021. Patients having amputation at or above the level of the wrist or ankle were included. All these patients were analysed retrospectively. A detailed study of age, sex, type and circumstances of electric burn, pre-hospital treatment, course in the hospital and the outcome of patients were done.

RESULTS

A total no. of 40 patients were included in this study. Upper limb amputation (82.5%) were more than lower limb (17.5%). Males (95%) were more than females. Their age distribution was in a range of 12 yrs to 79 yrs. The most common age group was 31-40 (57.5%) followed by 21-30 (25%). The rural population (77.5%) was more prone than urban. The most common occupation affected was farmer (70%). 92.5% of patients sustained high voltage electric burn. Most (90%) patients were admitted after 6 hrs of burn. Only a few (7.5%) patients received fasciotomy before admission. 37.5% of patients underwent fasciotomy after admission. 75% patients presented with charring/gangrene/flexion contracture and 65% of patients presented with dark/concentrated urine at the time of admission. Associated significant injuries were present in 12.5% and comorbidities were present in 10%. Out of these patients, 95% were discharged, 2.5% expired and 2.5%.

Table 1 Characteristics of patients

Age	upto 10yr-0(0%)	11-20yr- 1(2.5%)
	21-30yr-10(25%)	31-40 yr- 23(57.5%)
	41-50yr-2(5%)	51-60yr-2(5%)
	61-70yr-1(2.5%)	71-80yr-1(2.5%)
	Above 80 yr- 0(0%)	

Sex	M - 38(95%)	F - 2(5%)
Occupation	Farmer-28(70%) electricworker- 5(12.5%) Industrial worker- 5(12.5%) Other - 2(5%)	
Amputated limb	Rt upper limb-26(65%) Lt Upper Limb-7(17.5%) B/L Upper limb-0(0%) Rt Lower Limb-4(10%) Left Lower Limb-3(7.5%) B/L Lower Limb-0(0%)	
Community	Rural- 31(77.5%)	Urban-9(22.5%)
Type of Voltage	High Voltage(>1000 V)- 37(92.5%) Low Voltage (<1000V) -3(7.5%)	
Time of admission	<6 Hrs - 4(10%)	> 6 Hr-36(90%)
Fasciotomy	<6 Hrs- 3(7.5%) > 6 Hrs-15(37.5%) Not done -22(55%)	
Gangrene/Charring/Flexion contracture	Present- 30(75%)	Absent -10(25%)
Other significant injury	Present-5(12.5%)	Absent-35(87.5%)
Comorbidity	Present-4(10%)	Absent -36(90%)
Urine	Dark and concentrated-26(65%) Normal colour-14(35%)	
Outcome	Discharge-38(95%) Expire-1(2.5%) Abscond-1(2.5%)	

DISCUSSION

In our study, most common age group affected was 31-40 yrs and males were more affected than females. This age group is exposed to high-tension lines and active in industrial work. Lack of safety and awareness is the cause of more involvement of the rural population. Most patients were right handed so their right hand affected more. Delayed fasciotomy after admission at tertiary care level did not improve the outcome and they did not receive the fasciotomy at referral level. Patients who did not consent, could not be treated with fasciotomy. Electric burn itself was the main reason for amputation as other significant injuries and comorbidities were rare. Very few patient expired and most of the patients discharged after amputation.

CONCLUSIONS

In our study, the predisposing factors for amputation in electric burn patients found at our institution are- Age 31-40 yrs Occupation Farmer High voltage contact Fasciotomy facility is not available in early

phase Charring/ gangrene/ flexion contracture on admission Dark/ concentrated urine on admission Our study concluded the following guidelines for prevention of amputation in electric burn patients- Education of rural population about the risks of electric burn Awareness of safety measure while dealing with electrical appliances Training at referral level to identify the appropriate candidates for fasciotomy and early referral of such patients Early fasciotomy and aggressive treatment of electric burn patients

Conflicts of interest- None

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