



Clinical Profile and Outcome of Electric Injury in North Indian Populations

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Abstract

Introduction- *Electric burn injuries represent a dangerous nature of injury in which disability is high and functional and aesthetic sequel are significant. A pathophysiology depending on voltage, current flow and resistance of skin.*

Aims And Objectives -1-Demographic study of electric burn 2-To study clinical profile of electric burn patients, various preventive measure to avoid electric burns, Role of fasciotomy and its timing benefits 3-To look management strategy and to determine prognosis of electric burn patients in presence of complication, how its turn in effects morbidity and mortality.

Materials And Methods- *The study period was January 2010 to December 2012. Only electric burn patient were included. Patient data were included in detail with references to their age, sex, mode of injury, surface area, part of body affected, hospital stay, occupation, outcome.*

Results And Conclusion- *The study of 180 patients show that electric burn injuries cause significant morbidity and mortality. Majority of patients were male from most active group of society 15-40 yrs age. Upper limb was most affected part of body and amputation were most common surgery perform. Early and adequately done fasciotomy has a significant role in electric burn injuries to lower the incidence of amputation in extremities. Proper education, communications and rehabilitation may reduce the social burden due to occupational hazards. To prevent this life-threatening event, measures should be taken by health-care officials and social networks to help educate the people about application of safety equipment, proper communication in between electrical department workers and improvement medical facility regarding burn cases or early refer of complicated burn to higher centre, through every available means of communication.*

Keywords- *Electric injuries, upper limb, amputation, occupation hazards, Prevention*

INTRODUCTION

Human life has changed rapidly since the introduction of electric energy for commercial requirements. The life of man today, without

electric energy, would be empty. However, the benefits of this "good" energy in stable conditions can be transformed into destructive agents for the human organism. Electrical injuries occur when the human body comes into contact with an

electric arc, due to electricity passing through the human body. Electrical injuries are very aggressive pathological lesions with heavy functional and aesthetic consequences.^[10,14] The primary cause of their gravity is the progressive tissue necrosis that occurs with the continuous extension of wound necrosis, even leading to loss of the entire injured extremity. It occurs less frequently than scald and direct flame burn. Electrical burn can come from low-voltage or high-voltage currents. The pathophysiology of electrical burn depends on the voltage, current flow, and tissue resistance.^[8,14,16] The effect of current determined by these factors like type of current AC/DC, amount of current, pathway of current, duration and area of contact. The damage caused by electrical burn is due to two mechanisms, the local generation of heat and the direct action of the passage of the current itself through the tissue. The heating causes coagulative necrosis of the cells and the current causes cell membrane disruption that leads to tissue loss and death

AIMS AND OBJECTIVES –

- 1 Demographic study of electric burn
- 2- To evaluate different etiology of electric burn and how its turns in effects morbidity and mortality .
- 3-To study clinical profile of electric burn patients, various preventive measure to avoid electric burns ,Role of fasciotomy and its timing benefits

RESULTS-

In the present study of 180 cases of electric burn patients, following data has been analyzed

PART OF BODY AFFECTED

PART OF THE BODY	NO.	PERCENTAGE
HEAD/NECK	45	25.00
UPPER LIMB	139	77.22
CHEST	65	36.11
ABDOMEN	51	28.33
LOWER LIMB	88	48.88

4-To look management strategy and to determine prognosis of electric burn patients in presence of complication.

MATERIAL AND METHODS

This prospective study carried out on 180 electric burn patients in burn ward unit in department of surgery Mahatma Gandhi hospital associated with DR. S.N. Medical College, Jodhpur, Rajasthan. Mostly admitted from emergency department and managed in burn unit .Records of patients admitted during last three years from January 2010 to December 2012 were studied .Patient data were examined in detail with references to their age, sex, mode of injury, part of body affected, surface area involved ,hospital stay ,urban/rural area, operative procedure-fasciotomy, escherotomy, debridement, amputation, subclavian ligation, split skin grafting, collagen sheet application, complications, morbidity-mortality, ultimate outcome of disease. Management of electric burn patients include immediate assessment of general condition of patients then wound clean and dressed by solution povidone iodine, oint. Silveraxe. ECG done for ruleout cardiac complication. centerline put and start infusion ringer lactate as per body surface area. foley's catheterisation for urine output monitoring. input/output charting done. baseline blood investigation and ABG done. General physical and local examination were done. If need, immediate fasciotomy done to prevent compartment syndrome in extremities.

2-VARIOUS OPERATION PERFORMED IN ELECTRIC BURN PATIENTS

PERFORMED OPERATIONS	NO.OF PATIENTS	PERCENTAGE
FASCIOTOMY	60	33.33
AMPUTATIONS	72	40.00
DEBRIDEMENT	68	37.77
SUBCLAVIAN VESSELS LIGATION	15	08.33
SKIN GRAFTING	30	16.66
TOTAL SURGERY	245	136.11

3-DISTRIBUTION OF PATIENTS ACCORDING TO LEVEL OF AMPUTATION IN UPPER LIMB

LEVEL OF AMPUTATION/ DISARTICULATION	NO OF SURGERY	PERCENTAGE
INTERPHALANGEAL	18	21.68
METACARPO-PHALANGEAL	15	18.07
WRIST	6	07.22
BELOW ELBOW	28	33.73
ABOVE ELBOW	13	15.66
SHOULDER	7	08.43
TOTAL	83	100

4-DISTRIBUTION ACCORDING TO BSA INVOLVED AND MORTALITY/MORBIDITY

% BSA	MALE		FEMALE		TOTAL		DISABILITY/MORBIDITY		MORTALITY	
	NO	%	NO	%	NO	%	NO	%	NO	%
0-9	80	49.38	4	22.22	84	46.66	16	19.04	00	00.00
10-18	41	25.30	5	27.77	46	25.55	26	56.52	00	00.00
19-27	12	7.40	4	22.22	16	08.88	12	75.00	02	12.50
28-36	08	4.90	3	16.66	11	06.11	06	54.54	03	27.27
37-45	09	5.50	1	05.50	10	05.55	04	40.00	05	50.00
46-54	05	03.00	1	05.50	06	03.33	01	16.66	02	33.33
55-63	04	2.40	0	00.00	04	02.22	00	00.00	04	100
ABOVE 63	03	01.80	0	00.00	03	01.66	00	00.00	03	100
TOTAL	162	100	18	00.00	180	100	65	36.11	19	10.00

5-ELECTRIC BURN AND DISABILITY

MORBIDITY	NO.OF PATIENTS	PERCENTAGE
UPPER LIMB LOSS	30	41.66
LOWER LIMB LOSS	12	16.66
FINGER LOSS	19	26.38
TOE LOSS	6	08.30
PARAPLEGIA	3	04.16
OTHER	2	02.77
TOTAL	72	100

6- MORTALITY/MORBIDITY

YEAR	MORTALITY				MORBIDITY			
	FARMER		ELECTRICIAN		FARMER		ELECTRICIAN	
	NO	%	NO	%	NO	%	NO	%
2010	3	37.5	1	14.29	09	30.00	6	25.00
2011	3	37.5	3	42.86	10	33.33	8	33.33
2012	2	25	3	42.86	11	36.66	9	37.50
TOTAL	8		7		30		24	

7-OCCUPATION DISTRIBUTION

YEARS	FARMER		ELECTRICIAN		OTHERS		TOTAL
	NO.	%	NO.	%	NO.	%	
2010	22	51.16	11	25.58	10	23.25	43
2011	27	38.57	25	35.71	18	25.71	70
2012	31	46.26	21	31.34	15	22.38	67
TOTAL	80	44.44	57	31.66	43	23.88	180



DISCUSSION

Study of 180 electric burn patients show that maximum patients having burn was in most active age group of 21-30 years^[1,2,6,10] Among the 180 victims of electric burn 162 (90 %) were male and 18 (10 %) were female^[8]. Study show that the hospital stay was maximum in BSA group of 28-36% which comprise the average duration of 26.24 days. Minimum stay was among the BSA group of 55-63 % having the average stay of 3.3 days.^[10] Average duration of hospital stay was maximum in the BSA group of 28-36% among survived patients which comprises 28 days .As the BSA increase the duration of hospital stay increase but after 40 % BSA the duration of hospital stay decrease due to early deaths. The maximum No of death was from 37-45 % BSA group and the average duration of hospital stay was maximum in BSA group of 37-45 %. This is because the probability of patients survival is less with increasing BSA .Out of 180 electric burn patients the order of body parts involved was as : upper limb >lower limbs>chest>abdomen >Head/neck .Around 139(77.22 %) patients were affected from upper limb involvement^[3,4] Head/Neck part least affected part ,only 45 (25%) patients.(Table 1).In 80 electric burn patients total 245 surgeries were performed among which 72 patients required amputation.^[7] Maximum no. of amputation were below elbow(33.73 %).Among them 15 % were converted in to above elbow amputations.Debridement and fasciotomy were the second and third commonly performed operation. Subclavian ligation were the least common performed surgery. (Table 2,3).Most patients in this study were having body surface area from 0-9 % which comprises 46 % of all patients.^[9] Mortality was maximum in BSA group of above 40 % burn but Disability was higher in BSA group of 19-27 % .^[5] (Table 4).Total 65patients suffered the disability in which 30 (41.66%)loosed their upper limb.^[3,4]The second and third common disability were digital loss and lower limb loss.(Table 5)

Septicemia contributes maximum 41.17 % in the cause of mortality and least common cause of death head injury/spinal shock.^[14]In this study out of 162 male patients 16(10 %) and only 3(15%) out of 18 female patients were expired. This show male are more exposed to electric burn and also more prone to death(Table4).out of 80 farmers 8 (10 %) were expired and out of 57 electricians ,7 (12.28 %)were expired which is a significant number. In this prospective study, mortality was almost stationary in three years but morbidity was increase in both farmers and electrician community along with increase number of patients(table 6-7).morbidity in farmer about 37 % and in electrician about 42 %. Permanent disabilities makes the person physically dependent to others and increase the significant social burden. Most of farmer patients were came from rural area ,more then 50 km distance from our hospital, which was delayed cause of fasciotomy limbs and amputation were done. Upper limb was the most affected part of body which was more then 75 % and subsequently amputation (40 %) was the most common surgery performed^[3,4] .Early and adequately done fasciotomy has a significant role in electric burn injury of extremities as in undoubtedly lower the incidence of amputations by Decompression of muscle compartment. If needed, extent of amputation can be minimized. Morbidity increase with the increase of severity of burn till 50 % Body Surface Area, After that mortality supervenes the morbidity. Septicemia was the leading cause of death which was the significant no. 41.17 % .Mortality and Morbidity is mainly due to High tension electric wires. Mainly this type of injuries occurs in farmers and electricians in rural areas because of lack of general awareness, communication problems , inadequate precaution, lack of accessibility of safety products and protective measures taken while working in presence of high voltage current along with intense rural electrification projects are underway. Lines are laid over trees in rural areas exposing

farmers and children to risk. Increased number of accidents in winter months is due to more of faulty lines following heavy snowfall. It cause significant damage mainly to Farmers and electricians people. Electric burn injury has been exposed as a occupational hazard for both farmers and electricians. It can be prevented by educating the people about the proper handling to electric circuits, use of safety equipment, dress and devices. Farmers must use plugs in wire while working on tub wells, avoid illegal electric connections ,make distance at least 10 meter from high tension electric current wires at workplace. Proper rehabilitation of the handicapped person and employment to the member of the affected family may reduce the social burden caused by such electricity concerned accident.^[12]

CONCLUSION

Electric burn is serious kind of injuries ,leading to permanent disabilities make the people physically dependent to others ,increase poverty. Upper limb was most affected part of body and amputation were most common surgery perform .Early and adequately done fasciotomy has a significant role in electric burn injuries to lower the incidence and level of amputation in extremities with good rehabilitation by best ,low economic ,well balanced prosthetics. Proper education, communications and rehabilitation may reduce the social burden caused by occupational hazards.To prevent this life-threatening event, measures should be taken by health-care officials ,electric department officers and social networks to help educate the people about application of safety equipment ,proper communication in between electrical department workers and improvement medical facility regarding burn cases or early refer of complicated burn to higher centre, through every available means of communication.

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