

Electric Burn as Hazard for Farmers-We Need to Improve

Dr.Satya Prakash Meena¹, Dr.Manisha Jhirwal², Dr.Pankaj Kumar Saxena³

¹Dr.Satya prakash meena- senior resident, department of surgery, All India institute of medical sciences, Delhi,India

²Dr.manisha jhirwal- Senior resident, department of obs-gynae,safderjung hospital, Delhi, India

³Dr.pankaj Kumar saxena - professor and unit head ,department of surgery,S.N.medical college, jodhpur, Rajasthan, India

Abstract

Introduction- Electric burn injuries represent a special type of lesion in which morbidity is very high. An electrical burn is a burn that results from electricity passing through the body causing rapid injury. Electrical burns differ from thermal or chemical burns in that they cause much more subdermal damage. They can exclusively cause surface damage, but more often tissues deeper underneath the skin have been severely damaged. As a result, electrical burns are difficult to accurately diagnose, and many people underestimate the severity of their burn. **Aims And Objectives** -1-To study clinical profile of electric burn in farmer patients 2-To study various preventive measure to avoid electric burns in farmers ,Role of fasciotomy and its timing benefits 3-To determine prognosis of electric burn in farmer patients in presence of complication.4- To evaluate incidence of morbidity and mortality . **Materials And Methods-** Farmers who suffered from electric burn were included in this study, with references to their age,sex,mode of injury ,surface area, part of body affected ,hospital stay,morbidity,mortality. This retrospective study done at burn centre ,mahatma Gandhi hospital,jodhpur,rajasthan,india.The study period was for three years since January 2010 to December 2012. **Results And Conclusion-**The study of 80 farmers show that electric burn injuries cause significant morbidity and mortality in a farmers .There was high incidence of amputation in upper extremities due to electric burns . Patients require early fasciotomy procedures for prevention of further progression of injury. Timely reconstructive surgery may improve final function and return to productivity. Proper education, communications and rehabilitation may reduce the social burden in farmer community. All effective measures should be taken by health-care officials, physicians and social networks to help educate the farmers in electrical burn prevention ,reduce morbidity and early refer of complicated burn to higher centre.

Keywords: Electric injuries,Farmer,Morbidity and mortality ,Prevention

I. Introduction-

Electrical burns can be caused by a variety of ways such as touching or grasping electrically live objects, short-circuiting, inserting fingers into electrical sockets, and falling into electrified water. Lightning strikes are also a cause of electrical burns, but this is a less common event.^[8] With the advances in technology, electrical injuries are becoming more common and are the fourth leading cause of work-related traumatic death.^[2] One third of all electrical traumas and most high-voltage injuries are job related, and more than 50% of these injures result from power line contact.^[1]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.

II. Aims And Objectives

- III. 1-To study clinical profile of electric burn in farmer patients
- IV. 2-To study various preventive measure to avoid electric burns in farmers ,Role of fasciotomy and its timing benefits
- V. 3-To determine prognosis of electric burn in farmer patients in presence of complication.
- VI. 4- To evaluate incidence of morbidity and mortality .

VII. Material And Methods

This descriptive prospective study was conducted in Department of general surgery, mahatama Gandhi Hospital, S.N. Medical College for a period of 3 years. All farmers admitted to the burns unit from January 2010 to December 2012 with electrical injuries were included in the study. A Performa was used to collect details. Total number of farmers included in our study was 80. Patients were treated by standard care of treatment . Results are quantified in terms of various complications, disability, mortality. Operative procedure included-fasciotomy, escherotomy, debridgement, amputation

,subclavian ligation, split skin grafting. On admission patient were resuscitated by Advanced Trauma Life Support protocol. Initial fluid management with Ringer's lactate was administered in sufficient amounts to maintain a urine output of at least 2 ml/kg/h. Myoglobinuria when present was treated with mannitol and sodium bicarbonate. ECG, Baseline blood investigation and ABG done to prevent cardiac and metabolic complications . General physical and local examination were done. If require ,immediate fasciotomy was done to prevent compartment syndrome in extremities.

VIII. Results

In the present study of 80 cases of electric burn farmer patients, following data has been analyzed

1- Part Of Body Affected

PART OF THE BODY	NO.	PERCENTAGE
HEAD/NECK	17	21.20
UPPER LIMB	68	85.00
CHEST	32	40.00
ABDOMEN	21	26.20
LOWER LIMB	50	62.50

2-Variou Operation Performed In Electric Burn Patients

PERFORMED OPERATIONS	NO.OF PATIENTS	PERCENTAGE
FASCIOTOMY	28	35.00
AMPUTATIONS	32	40.00
DEBRIDEMENT	30	37.5
SUBCLAVIAN VESSELS LIGATION	5 Prophylactic	6.25
SKIN GRAFTING	15	18.70
TOTAL SURGERY	110	137.50

3-Distribution Of Patients According To Level Of Amputation In Upper Limb

LEVEL OF AMPUTATION/ DISARTICULATION	NO OF SURGERY	PERCENTAGE
INTERPHALANGEAL	7	21.80
METACARPO-PHALANGEAL	6	18.70
WRIST	3	09.37
BELOW ELBOW	11	34.30
ABOVE ELBOW	5	15.60
SHOULDER	2	06.25
TOTAL	34	106

4-Distribution According To BSA Involved And Mortality/Morbidity

% BSA	MALE		FEMALE		TOTAL		DISABILITY/MORBIDITY		MORTALITY	
	NO	%	NO	%	NO	%	NO	%	NO	%
0-9	35	50.7	3	27.27	38	47.50	07	18.42	00	00.00
10-18	17	24.6	4	36.36	21	26.25	12	57.14	00	00.00
19-27	5	7.24	2	18.18	07	08.75	06	85.71	00	00.00
28-36	3	4.34	1	09.09	04	05.00	03	75.00	01	25.00
37-45	4	5.79	1	09.09	05	06.25	02	40.00	03	60.00
46-54	2	2.89	0	00.00	02	02.50	00	00.00	02	100
55-63	1	1.44	0	00.00	01	01.25	00	00.00	01	100
ABOVE 63	1	1.44	0	00.00	01	01.25	00	00.00	01	100
TOTAL	69	100	11	00.00	80	100	30	37.50	08	10.00

5-Electric Burn And Disability

MORBIDITY	NO.OF PATIENTS	PERCENTAGE
UPPER LIMB LOSS	14	41.17
LOWER LIMB LOSS	5	14.70
FINGER LOSS	9	26.47
TOE LOSS	4	11.76
PARAPLEGIA	1	02.94
OTHER	1	02.94
TOTAL	34	100

6- Mortality/Morbidity In Farmers

YEAR	NUMBER OF PATIENTS			
	MORTALITY		MORBIDITY	
	NO	%	NO	%
2010	3	37.5%	09	30.00 %
2011	3	37.5%	10	33.33 %
2012	2	25%	11	36.66 %
TOTAL	8		30	

7.Revised amputations in upper limb

Revised amputation	number	percentage
Below wrist to above wrist	2	25.00%
Below elbow to mid arm	4	50.00%
Mid arm to shoulder	2	25.00%
Total	8	100.00%



IX. Discussion

Study of 80 farmer patients show that maximum patients having burn was in most active age group of 21-30 years.^[1,2,6,10] Among the 80 victims of electric burn 69 (86.25%) were male and 11 (13.75%) 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 80 farmer patients the order of body parts involved was as : upper limb >lower limbs>chest>abdomen >Head/neck. Around 68 (85%) patients were affected from upper limb involvement^[3,4] Head/Neck part least affected part ,only 17 (21%) patients.(Table 1).In 80 farmer patients total 110 surgeries were performed among which 32 patients required amputation.^[7] Maximum no. of amputation were below elbow(34.30 %).Among them 30 % 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 47 % of all patients.^[9] Mortality was maximum in BSA group of above 45 % burn but Disability was higher in BSA group of 19-27 % .^[5] (Table 4).Total 34 Farmer patients suffered the disability in which 14 (41%)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 69 male patients 7(10.14 %) and only 1(09 %) out of 11 female patients were expired. This show male are more exposed to electric burn and also more prone to death(Table 4).out of 80 farmers 8 were

expired which comprises around 10 % which is a significant number. In last year 2012 mortality was gradually decrease but morbidity was increase(table 6) 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 rural areas because of lack of general awareness, 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. Morbidity leading to permanent disabilities makes the person physically dependent to others and increase the significant social burden. It can be prevented by educating the farmers about the proper handling to electric circuits 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]

X. Conclusion-

Electric burn is a dangerous occupational hazard ,leading to permanent disabilities make the farmers physically dependent to others ,increase poverty. Patient require early fasciotomy procedures for prevention of further progression of injury. Timely reconstructive surgery may improve final limb function and return to effective productivity. Therefore, to prevent this life-threatening event, measures should be taken by health-care officials and physicians to help educate the farmers in electrical burn prevention and early refer of complicated burn to higher centre, through every available means of communication.

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