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A Clinical Study of Acute Hand Burns

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Abstract

Background: Hand is one of the most common part of the body involved in burns i.e. 80%. Even small burns in hand may result in severe limitations of function. Early initiation of physiotherapy, topical treatment, splintage, passive exercise, early excision and grafting in indicated cases are important treatment principles. **Aims & Objectives:** To study the clinical profile and management outcome of acute hand burns. **Materials and Methods:** A prospective study was conducted in 50 patients of acute hand burns due to thermal burns (scald, flame) at Dr. Vasantrao Pawar Medical College and Research Centre and SCL Hospital from January 2011 to December 2020 to study clinical profile and outcome. **Results:** A total 50 patients were included in our study. Majority of the patients were in 21 to 30 years 28%. Incidence of burns in females was found to be 68% and 24% in paediatric group. Second degree superficial burns were in 46% patients and treated with daily dressing and splintage. Deep dermal burns were in 34% patients and treated with daily dressing and split thickness skin graft. Collagen application was done in 14% patients with second degree superficial burns for early presenters. Early excision and grafting was done in 6% patients with second degree deep burns with exclusive hand burns who presented early. Hypertrophic scar accounts 20% of complications. **Conclusion:** Outcome of acute hand burns depends upon degree of burns, time interval and initiation of treatment protocol.

Keywords: Acute Hand Burns, Superficial Burns, Deep Burns, Early Excision and Grafting, Physiotherapy, Splintage

1. Introduction

Burn injuries are extremely common and are a major public health problem. Apart from high numbers of mortality, the pain, suffering and agony of burn survivors are immeasurable. Deformities[1] and contractures result in life long physical problems along with limiting optimum and normal functioning of the individual. The psychosocial problems after burn injuries remain in the minds of affected individuals, their family members and their young children for years to come. Burn injuries occurs due to a variety of electrical, thermal, mechanical sources and can be accidental, suicidal or even homicidal in nature. Consequently, efforts towards prevention have been limited[2].

The hand is ranked among the three most frequent sites of burns scar contracture deformity[2]. One of the major determinants of the quality of life in burns survivors is the functionality of the hands. Burns deformities, although largely preventable, nevertheless do occur when appropriate treatment is not provided in the acute situation or when they are part of a major burns. Reconstructive procedures can greatly improve the function of the hands. Appropriate choice of procedures and timing of surgery followed by supervised physiotherapy can be a boon for burns survivor. One of the major determinants of the

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quality of life in burns survivors is the functionality of the hands. Post-burn hand deformities, if bilateral, can make a burn survivor a total cripple. The problem is largely preventable by good initial care, which would include elevation of the hand, appropriate splinting, early grafting of deep burns and supervised physiotherapy. The present study was conducted to study the clinical profile and management outcome of acute hand burns.

2. Material and Methods

This is a prospective study conducted in the department of General Surgery in Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Adgaon, Nashik and SCL hospital, Ahmedabad. This was carried out from 1st January 2011 to 31st December 2020.

In this study we have included acute hand burns due to thermal injury (scald, flame, contact, firecracker burns).

2.1 Inclusion criteria for study

- Patient having less than sixty percent thermal burns.
- Sex - both males and females,
- Age - All age groups,

2.2 Exclusion criteria for the study

- Patients having more than sixty percent total burn surface area.
- Patients who expired.
- Patient who did not followed up at least for one follow up visit.
- Patients with electrical, chemical, radiation burns.

2.3 Work up

- Detailed history was taken.
- Complete and proper clinical examination.
- Investigations - Complete hemogram, Renal function test, Liver fuction tests, serum electrolytes, Arterial Blood Gas, HIV, Australia antigen, Urine routine microscopy, Chest x- ray (PA) view were done.
- Photographic record of patient at presentation, during surgery, at the time of discharge and each subsequent follow up visit was maintained.

2.4 Treatment Planning

All Patients more than fifteen percent burns treated with standard resuscitative measures, fluid resuscitation by Parkland formula[2], intravenous antibiotics, analgesics, monitoring of vital parameters, urine output. Blood transfusion (whole blood/ components) was given as per requirement.

For burns of upper limbs, the management protocols were decided as per the type of burns, presence of infection, extent of gangrene if any.

Following basic treatment principles were used.

- Evaluation of the size and depth of burn.
- Escharotomy[3,4] if indicated.
- Application of proper wound care dressing with silver sulfadiazine cream, Neomycin bacitracin ointment, collagen for second degree superficial burns (Picture 1A & B).
- Decision about conservative or operative treatment.
- Initiation of early hand physiotherapy and splinting.
- Surgical management: removal of eschar, skin grafting[5], early excision[6] and grafting, flap coverage if necessary.
- In patients with fresh scald burns, fresh superficial and intermediate second degree burns collagen dressing was applied.

2.5 Postoperative course

During the postoperative period, regular dressing and splintage given to prevent contractures. Patients were advised to do physiotherapy apply splints for a period of six months.

2.6 Follow up

Patients were observed for any complications such as hypopigmented patch/ hypertrophic scar/ contracture/ joint stiffness/ syndactyly/ deformity[1].

3. Observations and Results

A total of fifty patients were included in the present study.

Table 1 shows that the incidence of burns is more in age group of 21 to 30 years. Patients 12 years and below

Table 1. Age-wise distribution of study participants

Age Group (yrs.)	Frequency	Percentage
0-10	11	22.00%
11-20	7	14.00%
21-30	13	26.00%
31-40	9	18.00%
41-50	7	14.00%
>50	3	6.00%
Total	50	100.00%

Table 2. Gender-wise distribution of study participants

Gender	Adult	Pediatrics	Total
Male	10 (26.32%)	9 (75%)	19 (38%)
Female	28 (73.68%)	3 (25%)	31 (62%)
Total	38 (100%)	12 (100%)	50 (100%)

Chi Square test		
Pearson Chi square	DF	P value
9.1748	1	0.002454

Table 3. Mode of burn injury among the participants

Serial no.	Mode & type of burns	No. of patients	Percentage
1	Suicidal flame burns [SFB]	8	16.00%
2	Accidental flame burns [AFB]	29	58.00%
3	Homicidal burns	0	0.00%
4	Accidental scald burns	5	10.00%
5	Fire cracker burns	8	16.00%
	Total	50	100.00%

included in pediatric age group. Pediatric group had 24% incidence. The incidence of burns is more in females i.e., is 62% compare to males (Table 2). Chi square test was applied to find association between gender with the occurrence of acute hand burns. ($p = 0.002454$, statistically significant).

Table 3 shows the mode of burn injury among the participants. History of Accidental flame burns seen in 58% patients while Suicidal burns seen in 16% patients. No Homicidal burns case was recorded in the present study. Fire cracker burns were seen exclusively in paediatric patients during Deepawali festival, with incidence of 16%. Flame burns is the most common type of burns (90%) found in the present study. (Table 4)

Antimicrobial Silver sulfadiazine cream was most commonly used in 66% patients with mixed type of burns i.e. second degree superficial to deep burns. Neomycin-Bacitracin ointment and collagen dressing were used exclusively in second degree superficial burns early presenters only (Table 5).

Study participants were managed as per standard treatment protocol described earlier and the recovery

Table 4. Type of burn injury among the participants

Etiology	No. of patients	Percentage
Scald	5	10.00%
Flame burns	45	90.00%
Total	50	100.00%

Table 5. Type of dressing used

Type of dressing	No. of patient	Percentage
Silver Sulfadiazene	33	66.00%
Neomycin bacitracin ointment	10	20.00%
Collagen	7	14.00%
Total	50	100.00%

Table 6. Recovery time after different management interventions

Subgroups	**No. of patients**	**Mean recovery time in days.**
Daily dressing and splintage	23	12
Daily dressing, splintage and delayed Skin grafting	17	39
Collagen application	7	11
Early excision and split thickness Skin grafting	3	16
Total	50	100.00%

Table 7. Complications among study participants

Observations	No. of complications	Percentage
Contracture	2	4.00%
Hypertrophic Scar	10	20.00%
Joint Stiffness	5	10.00%
Hyperpigmentation	4	8.00%
Syndactyly	1	2.00%
Nil	32	64.00%

Picture 1. A. Second degree superficial burns- Day-1. B. Second degree superficial burns Day-12.

Picture 1. A. Deep dermal Burns. B. After tangential excision and skin grafting.C. Functionally and aesthetically better hand after one year of follow up

time was noted in each patient. These patients were sub grouped as per the intervention or the surgical procedure as stated in (Table 6). Compared to delayed skin grafting, early excision and skin grafting had shorter recovery period in second degree deep dermal burns. Recovery in second-degree superficial burns treated with daily dressing and collagen was almost comparable (Table 6) (Picture 1A & B, Picture 2 A, B & C).

The clinical status of all patients was noted at one month, three-month, six months, and one year. All patients had healed wounds at the end of follow-up. Out of fifty patients 32 patients i.e. 36% had normal hand near normal external appearance and patients excluding contracture (4), syndactyly (1), and joint stiffness (4) had near normal functions i.e. 82%. Patients with Second degree deep burns have following complications and most common was hypertrophic scar in 20% cases. Restricted hand function in 18% of patients (Table 7).

4. Discussion

Out of the total 50 participants with acute hand burns them 28 were adult female and 10 were males. Majority of female patients sustained burns in kitchen 62% i.e., 31 patients. Out of 19 males 9 had burns in kitchen. This shows more vulnerability of Indian females in kitchen; the average age range being between 21 to 30 years.

Around 12 paediatric cases of burns were noted in the present study. Most of paediatric patients had scald burns due accidental fall of hot water/milk or spillage of hot oil on body. They all had burns at home. All Patients with firecracker burns were from the paediatric age group.

All these patients were treated with standard protocol mentioned earlier. Three patients were treated with early excision and grafting. The average recovery period in these patients was 16 days. Harrison D H and Park House had also found these advantages of early excision and grafting in their study. In our study we used sheet grafts after early as well as delayed excision. We have done seventeen delayed excision and grafting. Sheet autografting should be considered for more important cosmetic and functional areas, such as the face and hands[7]. Seven patients with second degree superficial burns were treated with collagen dressings since the day of admission. These patients had mean recovery time twelve days.

In all patients after coverage of raw area and healing, splinting, physiotherapy, and pressure garments were advised. These patients had minimal complication rates. Only four developed contractures, four developed joint stiffness, and ten developed hypertrophic scar at three month of follow up. Majority of the patients had satisfactory range of movements and good hand function.

Pegg and Associates[8] reported 411 patients having a 7.8% incidence of development of burn scar contracture.

Those patients, who did not follow splintage and physiotherapy advise developed joint stiffness and contracture. In our study four patient developed contractures. Dobbs and Curreri had reported serious contracture rate of 27% in the series of 681.These patients underwent contracture release surgery. The defect was closed by split thickness skin graft, Z- plasty, local flaps, distant flaps.

Prasad and colleagues[9] suggested that comprehensive treatment efforts led to significant reduction in development of burn scar contractures. These efforts include improved management of burns wounds, liberal use of positioning, improved splinting, early maintenance of range of motion and exercise programme.

Hentz VR[10] stated that a successful outcome requires correct splinting interspersed with active early motion, control of infection.

Colditz *et al.*[11]. has reported excellent results with the use of serial splinting and physiotherapy in the stiff joints. We had only 4 patients with stiff joint, these patients benefited with splinting and physiotherapy.

5. Conclusion

The main cause of thermal burns were kitchen related fire injuries, of which females were the usual victims. Children were usually affected by scald burns. Early collagen application in superficial second-degree burns promotes rapid healing and decrease recovery period. Early excision and grafting promote rapid healing and minimizes scar contractures. Physiotherapy and splintage in postoperative period is highly essential to prevent contracture and stiffness. Compression stockings are useful to prevent hypertrophic scar.

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