

Original Research Article

Clinicoepidemiological study of post burn contractures at a tertiary care centre in western India

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ABSTRACT

Background: Burn injuries are one of the commonest form of trauma globally with long term consequences in the form of contractures. The management takes a toll of time, money and stress, despite that the agony remains with the patient only. We intended to study the clinicoepidemiopathological aspects of post burn contractures for a better understanding and management purpose.

Methods: This study was conducted from October 2014 to February 2017 in a tertiary care hospital in western India and includes 51 patients.

Results: In this study, we observed that the mean age of patients was 21.7 years and females formed 51% of the patient pool. Most of the patients came from a rural background with a mean distance of 77.72 kilometres from the treating hospital. Flame burns contributed to 78% of the cases, with hand (35.7%) being the most commonly involved area, 52.9% patients did not receive splinting or physiotherapy at the initial treatment of burns. Most cases were treated by split skin grafting (64.2%) and the most common complication seen in our study was infection, noted in 15.7% of cases whereas recurrence was seen in only one patient.

Conclusions: We observed that young adults were the predominant group of patients with a slight female preponderance. Factors like increased distance from the treating hospital, rural background of patients, poor healthcare facilities with poor rehabilitative facilities and irregular follow up of patients contributed to increased incidence of post burn contractures. We also noted that majority cases can be treated by contracture release with split skin grafting without major complications.

Keywords: Burn, Post burn contracture, Physiotherapy, Split thickness grafting

INTRODUCTION

Burns constitute the second highest incidence of trauma related deaths globally, second only to vehicular trauma both in developed and developing countries.¹ The most common mechanisms of injuries are scald and flame burns, while Chemical and electrical burns are less prevalent (<10%).² Once a patient has been resuscitated, efforts are then made to improve wound healing in order to prevent scarring and contractures as contractures lead

to a loss of function, poor cosmetic outcome, and reduced quality of life (QOL), pain and psychological consequences.^{3,4}

Contracture is abnormal deposition and maturation of collagen, which leads to hampering of function of joint or soft tissue structure and cosmetic disfigurement or both. Individuals with burn injuries are at risk for developing contractures due to multitude of factors. Patients with burns often are immobilized, both globally, as a result of

critical illness in the severely burned, and focally, as a result of the burn itself because of pain, splinting, and positioning.

Contractures place patients at risk for additional medical problems and functional deficits. Contractures interfere with skin and graft healing. Contractures of the upper extremities may affect activities of daily living, such as grooming, dressing, eating, and bathing, as well as fine motor tasks.^{5,6} As burn survival rates have increased significantly in the past few decades, it is important to shift the focus on preventing and treating contractures.

Aims and objectives

The study was carried out to study the distribution of demographic variables in post burn contracture patients, etiopathogenesis, predicting factors and the management aspects.

METHODS

Data was collected prospectively from October 2015 to February 2018 for consecutive non randomized patients presenting to the Seth Vadilal Sarabhai hospital a tertiary care Hospital in Ahmadabad. A total of 51 patients were included in the study. Inclusion criteria included all the patients presenting to outpatient department with post burn contractures or indoor patients developing contractures during their stay for treatment of acute burns in the aforementioned time frame. For the purposes of analysis, a limitation in the range of motion in at least one plane of motion at a specified joint was considered to be a contracture at that joint. Patients refusing treatment and patients with contractures due to any other aetiology, other than burns were excluded from the study.

All the included patients were subjected to detailed history taking including demographic data (age, sex, etc). A detailed general examination with importance to anaemia and nutritional deficiencies was carried out. Local examination of contractures at all the joints was done and recorded. The joints of interest included the shoulder, axilla, elbow, neck, knee and face. The subject's active range of motion at each joint was measured using a goniometer with a standardized technique. Multiple planes of motion (i.e. flexion/extension) were investigated at each joint and the extent of functional and/or cosmetic impairment was recorded. A clinical photograph of the contracture was then taken. Investigations with respect to preoperative fitness such as complete blood count, renal function tests, serum proteins, liver function tests, chest x ray and electrocardiogram whenever necessary were done in addition to local part X-ray.

Patients with contractures having functional deficit or loss in daily activity underwent surgical release of their contractures. The defect was repaired using a technique appropriate for the site involved like Z-plasty, incision or

excision of contractures with skin grafting or local or distant flaps. Post-operatively patients were splinted using Plaster of Paris splints which were later replaced by thermoplastic splints and were started with physiotherapy within a span of 3 weeks to maximize function.

Statistical analysis was done using SPSS (Statistical Package for Social Sciences) software and various descriptive statistics were used to calculate frequencies, percentages and means.

Patients were followed up for 6 months following discharge and details pertaining to long term complications, recurrence, compliance with physiotherapy were noted.

RESULTS

Demographic factors

Age and sex distribution

Post burn contractures were present in all age groups with the youngest patient being of three years while oldest was of 54 years. Maximum number of the patients belonged to 21-30 years age group (33.3%) (Figure 1).

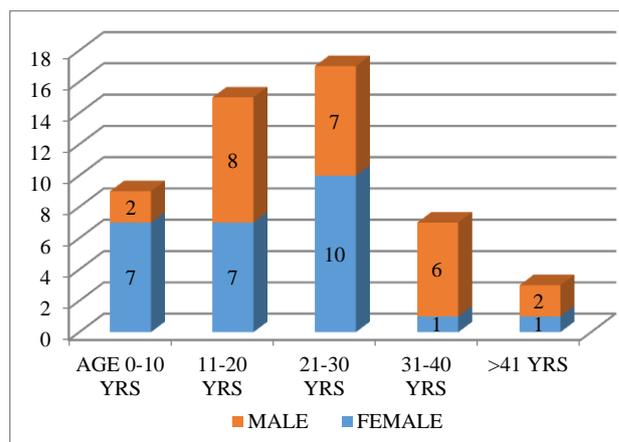


Figure 1: Age and sex distribution.

The mean age in the series was 21.7 years.

Post burn contractures were seen almost equally distributed among males and females with a slight preponderance towards the female gender.

Distance from treating centre

In our study of the 51 patients, nine patients were seen in the radius of less than 10 km from the hospital, 16 patients in 11-50 km radius, 12 patients in 51 -100 km radius and 10 1-300 km radius each, while 2 patients had come from more than 300 km away from the hospital. The mean distance from the treating hospital was 77.72 km (Figure 2).

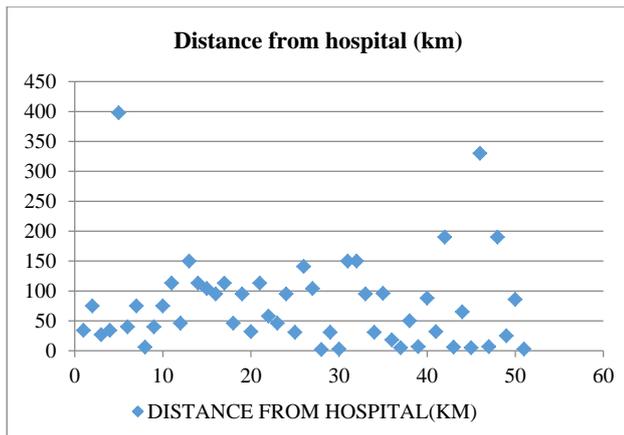


Figure 2: Distance from treating centre.

Factors related to burn injury

Etiology of burns

In our study of the 51 patients, most of the contractures were caused by flame burns (78%) while scald burns accounted for 5 (10%) patients and electric burns accounted for 6 (12%) cases (Figure 3).

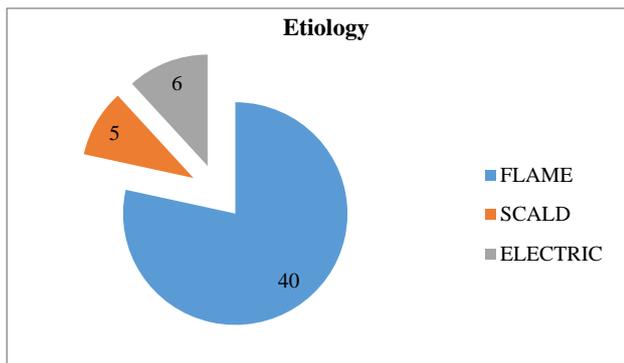


Figure 3: Aetiology.

Physiotherapy and splinting

Of the 51 patients included in our study, 27 patients were neither advised physiotherapy nor splinting was done while 10 patients were given splinting and 8 patients were given only physiotherapy. Only 6 patients were advised both physiotherapy as well as splinting (Table 1).

Table 1: Physiotherapy/splinting.

Modality	No. of patients	Percentage (%)
No splinting/physiotherapy	27	52.9
Splinting done	10	19.6
Physiotherapy given	8	15.7
Both splinting and physiotherapy	6	11.8
Total	51	100

Factors related to contractures

Site involved

Of the 51 patients included in the study, 5 patients had multiple sites and hence total came out to be 56. Of these, most common site involved was the hand (20 patients-35.7%) which included mainly volar contractures and few dorsal as well as web space contractures. Other joints involved in the decreasing order of frequency were neck (26.8%), axilla (10.7%), elbow (8.9%), face (8.9%), lower limb (5.3%) and wrist (3.5%). (Table 2).

Table 2: Site involved

Site involved	No. of sites involved	Percentage (%)
Hand	20	35.7
Neck	15	26.8
Axilla	6	10.7
Elbow	5	8.9
Face	5	8.9
Lower limb	3	5.4
Wrist	2	3.6
Total	56	100

Management

Of the 51 patients in our study, split thickness grafting was done in majority of patients (34 patients- 64.2%) while full thickness grafts were done in 9 patients and flaps were done in 6 patients and 4 patients underwent Z-plasties. Two patients underwent 2 procedures each, one had Z-plasty with Split thickness grafting and the other had full thickness graft for lip and a split thickness graft for neck thus making the total of procedures as 53 (Table 3).

Table 3: Treatment modality.

Procedure	No. of procedures	Percentage (%)
Split thickness skin grafting	34	64.2
Full thickness skin grafting	9	16.9
Abdominal flap	2	3.8
Groin flap	2	3.8
Cross finger flap	2	3.8
Z plasty	4	7.5
Total	53	100.0

Complications and their management

Of the 51 patients in our study, wound infection was the commonest complication which was seen in 8 patients (15.7%), followed by partial graft loss in 5 patients (9.8%), flap tip necrosis in 2 patients and in follow up of

6 months only 1 patient had recurrence of neck contracture which required reoperation (Table 4).

Table 4: Complications.

Complication	No of patients
Wound infection	8
Partial graft loss	5
Flap tip necrosis	2
Recurrence	1
Total	16

DISCUSSION

In our study, most patients were relatively young. This age group being the working class and involved in the activities like cooking is mostly exposed to hazards of flame burns. The socio-economic implications of such disabling conditions are even more devastating given the economically productive age of the victims. Several published studies have described a similar frequent involvement of younger individuals. In the study carried out by Adu on 68 patients the ages ranged from 0.66 to 60 years with a mean age of 22.53 years.⁷ In another study carried out by Saaq et al the ages ranged between 4 to 39 years and the mean age was 23.91 years.⁸ In the study carried out by Adu on 68 patients the male to female ratio was 1.83:1 while another study carried out by Saaq et al the ratio is 2.09:1 (67% males) and another study carried out by Iqbal in 2013 the male to female ratio was 0.4:1 with 69.5% females.⁷⁻⁹

The incidence of burns and its sequel, the post burn contractures are almost equal in both the genders. The female preponderance can be attributed to the fact that flame burns sustained during cooking due to unsafe modalities of cooking like chulah, kerosene stoves is still rampant in lower socio economic classes.

In this study, we observed that the mean distance from the treating hospital was 77.72 km. Despite the advances in medical sciences and multiple initiatives taken by the government, there still remains a dearth of quality health care available at affordable prices in the periphery of major cities. The fact that an average patient had to travel for more than 70 km for management of a functionally debilitating disorder exemplifies this fact. Also the lack of regular follow-up and subsequent absence of preventive measures can be attributed to long distances.

Flame burns by far are more common cause of burns as compared to scalds and electric burns. Flame burns are deeper and thus have more propensities for development of contractures as compared to scald burns. Electrical burns, although have a small total burnt surface area; have profound systemic complications thus increasing the risk of mortality and amputations due to vascular deficit rather than getting healed and developing a contracture.

In this study, we found that flame burns were the most common cause of post-burn contractures, accounting for 78% of cases. In a study carried out by Schneider et al for 985 patients, flame burns formed 61%, scald burns 7%, electrical burns formed 9% while another study conducted by Saaq found that flames were responsible for 81%, scalds for 9% and electrical formed the rest 10% of all the aetiologies of burn contractures.^{6,8}

Splinting and physiotherapy plays a very important role in prevention of post burn contractures. Multiple authoritative studies carried out by Kwan et al and Jordan have demonstrated the pivotal role of splinting and physiotherapy in management of burn contracture rehabilitation.^{10,11} In the study carried out by Saaq et al, they have reported that none of the patients in their study had received splinting or physiotherapy.⁸

Despite widespread prevalence of the problem of post burn contractures, rehabilitative strategies and preventive methods have not gained popularity. Illiteracy, poor health care facilities and lack of compliance on patient's part have compounded the impact. Of all the patients included in this study, 52.9% patients neither received splinting nor physiotherapy.

In our observation, hand contractures were the most common (35.7%), followed by neck (26.8%), axilla (10.7%), elbow (8.9%), face (8.9%), lower limb (5.3%) and wrist (3.5%).

In the study carried out by Adu, post burn contractures of the hand formed 40.79% of all cases while elbow and axilla was involved in 11.89% cases each, knee was involved in 6.58%, ankle in 5.25% and wrist in 2.63% cases.⁷ In another study carried out by Guven et al comprising of 77 patients, hand was the most frequently contracted joint with 49.35% cases, axilla with 24.7%, facial contractures formed 22.07%, while neck and elbow formed 7.7% and 3.9% respectively.¹²

Most of the patients in our study were managed by split thickness skin grafting (64.2%), followed by full thickness skin graft, abdominal flap, groin flap, cross finger flap and z-plasty in a decreasing order after the release of contracture. In a study carried out by Saaq et al, 69.2% underwent release of contractures with skin grafting, 23.9% underwent release of contractures with Z plasty, 5.4% underwent supraclavicular flap while abdominal flap was done in 1.5% patients.⁸ In another study carried out by Adu, out of the 68 patients he studied, with 73 procedures, 45.21% underwent release of contractures with pedicled flap coverage, 31.5% underwent full-thickness graft coverage while 5.5% cases underwent split thickness skin grafting.⁷ The usage of split thickness skin grafts produces no major donor site morbidity. The operation time compared with the other treatment choices is shorter and the follow up is easier. The postoperative hospitalization period is shorter. This

probably explains the reason why split thickness grafting was the most preferred treatment of choice.

We observed infection to be the most common post-operative complication, seen in 15.7% of all patients, followed by partial graft loss, flap tip necrosis and recurrence. In various studies carried out by authors like Cronin et al for management of contractures for various joints, infection and recurrence remain as the major complication with rates ranging between 5-25% cases.¹³ In a study carried out by Mody et al, the rate of re-contracture was 13.6% while Cronin has described a rate of 17% in his study.^{13,14}

CONCLUSION

In our study, we observed that post burn contractures were most commonly seen in young adults with a slight female preponderance. Majority of patients were found to come from a rural set up with limited treatment and rehabilitative facilities and a longer distance from the hospital, also contributing to irregular follow up. Thermal burns were the most common etiological factor with hand being most commonly involved. Most of the patients were treated by split skin grafting with infection as its most common complication which was managed conservatively in nearly all patients. This study can help in the policy making and better management of post burn contractures by emphasising on preventive aspects too.

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Conflict of interest: None declared

Ethical approval: Not required

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