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Original Article

Retrospective Study of Post-burn Contractures Admitted to Plastic Surgery Department of Assam Medical College, Dibrugarh, from March 2007 to March 2023

Utpal Kumar Bordoloi[1], Kamlesh Singh Maurya[2], Partha Sarathi Barooah[3], Partha Pratim Dutta[4], Dhruba Jyoti Deka[4]

[1]Professor and Head, Department of Plastic Surgery, Assam Medical College, Dibrugarh, Assam, India, [2]2nd Year MCh Resident, Department of Plastic Surgery, Assam Medical College, Dibrugarh, Assam, India, [3]Associate Professor, Department of Plastic Surgery, Assam Medical College, Dibrugarh, Assam, India, [4]Assistant Professor, Department of Plastic Surgery, Assam Medical College, Dibrugarh, Assam, India

Abstract

Introduction: "Burn" is a major Public Health issue worldwide. The deaths and disabilities due to burn injury largely are preventable.

Materials and Methods: The study comprises of 641 cases of post-burn contractures admitted to the Plastic Surgery Department of Assam Medical College from March 2007 to March 2023, who underwent various surgical procedures like contracture release followed by SSG, FTG Or flap cover, Z-plasty, Y-V plasty, etc.

Results: Out of 641 patients 373 (58%) were female and 268 (42%) were male. The age group mostly involved was 21–30 years (31%). The most common anatomical site of post-burn contractures was neck (22%) and the least common is post-burn contractures of abdominal skin (0.15%). All patients requiring SSG were advised pressure garment or pressure bandaging for 6 months or more. After following for 1 year and more results were found to be satisfactory in terms of functional and cosmetic outcomes. Secondary revision was required in 15% of cases.

Conclusion: Although prevention is better, post-burn contractures can be treated by surgical procedures, followed by pressure therapy, splinting, physiotherapy, and rehabilitation to give functionally and cosmetically acceptable results and better life.

Key words: Flaps coverage, Post-burn contracture, Skin grafting, Z-plasty

INTRODUCTION

Magnitude of the Problem

"Burn" is a major public Health Problem worldwide. In fact, more people die due to burn injuries than malaria and Tuberculosis. As per the WHO report 2014, in India, over 1,000,000 people are moderately or severely burnt every year. As per the data extrapolated from the information received from 3 major Government Hospitals in Delhi, approx. 1.4 lakh people die of burn injuries annually. This comes to 1 death every 4 min due to burns. Most of the burn victims belong to vulnerable group of the society, for example, people of low socio-economic class, old people and pediatric age group, suicidal and homicidal incident people exposed to professional hazards, The misery of burn patients is further aggravated as the treatment requires prolonged hospitalization and multiple corrective plastic surgeries, leading to work loss and economic hardship. However, the death and disability due to burn injury are preventable to a larger extent if timely and appropriate treatment is provided by trained personnel.[1]

In the year 2020, total number of fire call to the government of Assam fire and emergency services was 2617 out of which major fire call were 852, in which life injured from fire was 11 and life lost from fire was 248. Property involved

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Corresponding Author: Dr. Utpal Kumar Bordoloi, Department, Department of Plastic Surgery, Assam Medical College, Dibrugarh, Assam, India.

in fire was 3,996,472,840.00 (in Rs.) and property damaged from fire was 1,038,044,181.00 (in Rs.).[2]

BACKGROUND

After a burn the scarre which remaineth is uncommonly rough, unequal, and ill-formed.

Ambroise Pare.

All burns, deeper than the first degree and those taking longer than a week to heal, heal with a scar. The depth and distribution of burn injury determine the contracture and deformities. Burn injury is invariably associated with consequences such as hypertrophic scar, keloids with pain and itching, or sequelae such as scar and contractures, causing deformity, and disability. The functional, esthetic, psychological, and social consequences depend on the type and severity of thermal injury, being directly proportional to the time taken for healing.[3,4] Other factors contributing to these are delayed reporting for management, refusal of surgical management, noncompliance to instructions, and failure to report for follow-up. The post-burn sequelae - pain, pruritus, scarring, and contractures - affect the person's quality of life, thus mandating efforts to ameliorate these consequences. Excessive scarring and keloids have been described by Egyptian surgeons and recorded in Smith papyrus as early as 1700 BC.[5] The use of pressure as a treatment for disfiguring scars and contractures has been advocated by Ambroise Pare in the 16th century.[6] One of the consequences of burn injuries is contraction of scar, leading to contractures, which cause disfigurement, restriction in mobility, and interference with activities of daily living.

MATERIALS AND METHODS

Materials

The study comprises 641 cases admitted in the Plastic Surgery Department of AMCH with various post-burn contractures from March 2007 to March 2023.

Inclusion criteria

All patients of all age groups presented with post-burn contractures for eyelids, nostril, oral stoma, neck, axilla, elbow, wrist, fingers, breast synechia, abdominal wall skin, groin, knee, ankle, and toes were admitted to AMCH Hospital.

Exclusion criteria

Electric burns contractures, post-traumatic contractures, and post-infective contractures with post burn hypertrophic scar, hypopigmented scar, and keloid were not included.

Methods

Following surgical procedures were employed - single or multiple Z-Plasty, release followed by flap cover, split thickness skin graft/full thickness skin graft under different types of anesthesia - GA, SAB, BB, LA.

Follow-up: The follow-up of our cases ranged from 6 months to 1 year. The patients were followed up weekly/monthly intervals. During the follow-up, patients were examined for functional and cosmetic outcomes with reference to graft uptake, flaps inset, range of joint movement, and residual contractures.

RESULTS

In our study of 641 patients, the youngest member was 1 month and 3-day-old female and the oldest was an 80-year-old man. 373 were female (58%) and 268 were male (42%) patients [Table 1]. Maximum numbers of patients were in the age group of 21–30 years are 196 patients (31%) [Table 2]. In our study of 641 patients, the most common anatomical site of post-burn contractures was neck (22%) followed by hand (15%), fingers (10%), elbow (9.51%), axilla (9.20%), knees (6.55%), ankle/foot (3.74%), wrist (1.09%), post-burn ectropion of eyelids and PBC of chest/breast (0.78%), post-burn ectropion of lower lip (0.62%), angle of mouth (0.31%), and least common is post-burn contractures of abdominal wall skin (0.15%) [Table 3].

In our study, PBC neck out of 143 patient's majority 139 patients were treated by contracture release with SSG, only 4 patients underwent Z-plasty for linear contracture. 21 patients underwent contracture release under local anesthesia followed by intubation and further release and SSG [Table 4].

Table 1: Distribution of patients according to sex

Sex	Total number of patients
Female	373
Male	268
Grand total	641

Table 2: Distribution of patients according to age group

S. No	Age group range	Total number of patients
1	0–10 years	156
2	11–20 years	139
3	21–30 years	196
4	31–40 years	85
5	41–50 years	38
6	51–60 years	16
7	61–70 years	10
8	71–80 years	1

Table 3: Distribution of patients according to site of contractures

S. No	Types of contractures	Total number of patients
1	PBC Neck-Flexion=143	143
2	PBC Axilla-Adduction=58 -Abduction=0 -Flexion=1	59
3	PBC Elbow -Flexion=61	61
4	PBC Wrist -Flexion=1 -Extension=6	7
5	PBC Hand -Palm=98 -Web spaces (1,2,3,4 and 5) =23	98
6	PBC Fingers -MP Jt. -Flexion=7, Extension=27 -PIP Jt. -Flexion=83, Extension=5 -DIP Jt. – Flexion=53, Extension=0 -Extensor apparatus injury +_ PIP, DIP	66
7	PBC Knees -Flexion=42	42
8	PBC Ankle/foot -Dorsiflexion=23, -MTP Jt. Extension=14 -Post-burn syndactyly=7	24
9	PBC Angle of mouth -Unilateral=2, Bilateral=0	2
10	Post-burn ectropion of eyelids -Upper=1 -Lower=4	5
11	Post-burn ectropion of lower lip=4	4
12	PBC Chest/breast -Breast synechia=3 -Breast -Right=3, Left=2	5
13	PBC Abdominal wall skin=1	1

Table 4: Distribution of patients according to anesthesia

S. No	Types of anesthesia	Total number of patients
1	General anesthesia	489
2	Local anesthesia -Digital block=115 -Wrist block=7	112
3	Spinal anesthesia	33
4	Regional anesthesia -Brachial block -Other	7
	TOTAL	641

Table 5: Distribution of patients according to types of surgery performed

S. No	Types of surgery	Total number of patients
1	Contracture release and SSG	614
2	Z-plasty	21
3	Contracture release and FTG	5
4	Contracture release and flap coverage	8
	TOTAL	641

Out of 98 majority of patients with PBC hand, 95 patients were treated by contracture release and SSG only 3 underwent Z-plasty.

Figure 1: Pre-operative PBC NECK

Figure 2: Intraoperative contracture release

Figure 3: Post-operative contracture

66 patients of PBC fingers, 47 patients underwent release and SSG, 8 patients by Z-plasty, 7 patients cross finger flap, and 3 patients underwent full-thickness grafts.

PBC elbow of 61 patients, 60 patients underwent release and SSG only 1 patient required Z-plasty

PBC axilla of 59 patients, 54 patients underwent release and SSG only 5 patients required Z-plasty [Figures 1-6 and Table 5].

Figure 4: Pre-operative PBC knee

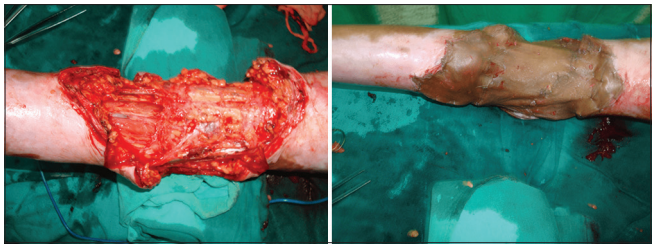

Figure 5: Intraoperative Contracture release and resurfacing of the defect with SSG

Figure 6: Post-operative contracture

DISCUSSION

In the present study, 641 cases were admitted to plastic surgery ward with various post-burn contractures in the AMCH Dibrugarh Hospital from March 2007 to March 2023.

In the present study, 373 were female (58%) and 268 were male (42%) patients. The findings of the present study were similar to the following studies.

Buja *et al*.[7] showed in their study among 188 patients that there were 82 men (43.6%) and 106 women (56.4%) having post-burn contractures defects.

Shahid *et al*.[8] showed in their study that female proportion was high (56%) and were significantly sustained by scald and flame burn, whereas males (44%) were observed by electric (84.2%) and contact burns (78.3%). The upper limb's anatomical part was most commonly affected (11–20%) TBSA burned in 36.4% of patients and 71.6% sustained partial thickness and mixed deep thickness.

Hassan[9] included in his study 30 patients complaining of post-burn neck contracture 19 patients (63.33%) were female and 11 patients (36.67%) were male.

The present study show post-burn contractures of neck 143 (22%) followed by hand 98 (15%), fingers 66 (10%), elbow 61 (9.51%), axilla 59 (9.20%), knees 42 (6.55%), ankle/foot 24 (3.74%), wrist 7 (1.09%), post-burn ectropion of eyelids and PBC of chest/breast 5 (0.78%), post-burn ectropion of lower lip 4 (0.62%), angle of mouth 2 (0.31%), and least common is post-burn contractures of abdominal skin 1 (0.15%). Findings of the present study were similar to the following studies.

In the study conducted by Bhatnagar *et al*.[10] in which out of 786 patients 297 (37.8%) patients had hand contracture, 118 (15%) had axilla contracture, 194 (24.7%) patients had elbow contracture, and 145 (18.5%) patients had finger contracture.

In the study conducted by Dogra *et al*.,[11] out of 100 cases, 23 cases (23%) had axillary contracture, 17 cases (17%) had elbow contractures, 20 cases (20%) had wrist region contracture, 46 cases (46%) had contractures involving various digits of the hand.

In our study, out of a total of 641 patients, 614 (95.78%) patients were treated with contracture release with SSG, 21 (3.27%) patients were treated with Z plasty. Findings of the present study were similar to the following studies.

In the study conducted by Nagaprasad and Karthik[12] out of 30 patients, 90% of patients underwent contracture release and split skin grafting whereas 10% of patients underwent z-plasty.

In the study conducted by Bhatnagar *et al*. 572 (72.8%) patients were treated with split-thickness grafting and 61 (7.8%) patients were treated with split-thickness with Z plasty.

In another study done by Dogra *et al*. out of 100 cases release of contracture by Z plasty was carried out in 30 cases however as many as 51 cases were managed by release/excision of scar/contracture and soft tissue cover by SSG. Contracture release and cover by FTSG were employed in 19 cases.

CONCLUSION

The purpose of every surgical operation is to carry out a stable coverage of the involved area and to avoid the recurrence of contracture or chronic ulcers or breakdown. Caleffi E., Bocchi A., Toschi S., Ghillani M. Annals of the MBC - vol. 3 - n' 1 - March 1990.

PBC can be treated, but preventing these consequences when treating burns will be more advantageous and cost-effective. Skin grafting is a simple, reliable, and safe operation. Planning and timing of various stages of operation are done carefully. Postoperative pressure garments, splintage, and physiotherapy are equally important.

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