

A clinical study on different surgical options for management of post-burn axillary contractures



Akash Gupta¹, Sudhir Kumar², Chitrangana Gupta³

¹Assistant Professor, ²Professor, Department of Surgery, ³Assistant Professor, Department of Anaesthesia, M.L.B. Medical College, Jhansi, Uttar Pradesh, India

Submission: 15-09-2023

Revision: 30-11-2023

Publication: 01-01-2024

ABSTRACT

Background: Post-burn contracture is a common sequela occurring after burn. Upper limb contracture like axilla is also occurring more commonly because it is most mobile part of body and likely to involve in burn. Post-burn contracture of axilla leads to functional deficit as it limits the movement of upper extremity mainly abduction and extension. Patients with axillary contracture are unable to utilize his upper limb because he is unable to take the hand at required site. **Aims and Objectives:** The objective of this study was to study various operative strategies for patients presenting with post-burn axillary contracture. **Materials and Methods:** Twenty patients presenting with post-burn axillary contractures were taken in our study. **Results:** In our study of 20 patients of post-burn axillary contracture, five patients had Grade I (25%), Grade II 05 (25%), Grade III 01 (5%), and Grade IV 09 (45%) contractures. Regarding surgical procedure, Z-plasty was done in 8 patients (40%), release with skin grafting 10 patients (50%), and local flap done in 2 patients (10%). In our study, the mean degree of range of motion achieved after release of axillary contracture was 120°. In our study, 2 patients (10%) developed re-contracture, 1 patient (5%) had a graft failure while 85% of the patients had no complications. **Conclusion:** In the present study of 20 cases of management of post-burn axillary contracture, it is reasonable to conclude that the prevention of contracture is of utmost importance. The choice of surgical procedure for reconstruction of post-burn axillary contractures can be made according to the pattern of scar contracture and the state of the surrounding skin. The choice of a flap should have priority over the skin graft due to the superior functional and esthetic results of flaps. The results were satisfactory in our study in most cases with regard to quality of life, coverage, and range of motion.

Key words: Burns; Axillary contracture; Z-plasty; Skin grafting

INTRODUCTION

A burn is a wound in which there is coagulative necrosis of the tissue. From the time, immemorial burns have attracted the attention of scientist in respect of their causation, prevention, and management including restoration of figure and function. Over 1 lakh people are affected by burn every year in India and 20 thousand of them die per year.¹ A patient who receives the best of modern burn treatment is expected to heal without any contracture. However, contractures do form even in the best of facilities.² This is

because contraction is a strong natural force and difficult to counter. Unfortunately, the incidence of post-burn contractures is extremely high in our country. Post-burn contracture is a common sequela occurring after burn. Upper limb contracture like axilla is also occurring more commonly because it is most mobile part of body and likely to involve in burn. Post-burn contracture of axilla leads to functional deficit as it limits the movement of upper extremity mainly abduction and extension. To minimize axillary contractures, the initial management of burn in this region should include proper positioning of the shoulder

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v15i1.58611

E-ISSN: 2091-0576

P-ISSN: 2467-9100

Copyright (c) 2024 Asian Journal of Medical Sciences



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Address for Correspondence:

Akash Gupta, Assistant Professor, Department of Surgery, M.L.B. Medical College, Jhansi - 284 128, Uttar Pradesh, India.

Mobile: +91-9179134980. E-mail: akashgupta.261@gmail.com

joint in an abduction splint and aggressive physiotherapy.³ Once scar contracture is established, surgical correction must be performed to prevent further involvement of the underlying structures. The goal of surgical correction of axillary scar contractures is to provide maximum correction with minimum or no local anatomic distortion.

This study aims to provide different surgical options for management of post-burn axillary contracture.

Aims and objectives

The objective of this study was to study various operative strategies for patients presenting with post-burn axillary contractures and their complications.

MATERIALS AND METHODS

Ethical Committee's approval was duly taken. Data were collected in the department of general surgery from the bed side tickets of the patients after taking a short history and informed consent from the patient.

This prospective observational study comprises 20 cases of isolated post-burn axillary contracture admitted in General and Plastic surgery unit in Maharani Laxmi Bai Medical College Jhansi from October 2021 to December 2022.

For patients who presented with post-burn axillary contracture, following surgical procedures were employed.

- Single or multiple Z-plasty
- Release of contracture with skin grafting
- Local flap (Fasciocutaneous island/parascapular).

Inclusion criteria

The following criteria were included in the study:

- All patients who presented with post-burn axillary contracture in the surgical outpatient department.

Exclusion criteria

The following criteria were excluded from the study:

- Patients who went LAMA or were lost during follow-up
- Contractures due to electric burn
- Recurrence of contracture
- Complex contractures involving other parts of upper limb like elbow or hand along with axilla.

Data collection procedure

- Patients fulfilling the inclusion criteria will be enrolled into the study and evaluation and recording in a preformed pro forma of the following will be done after getting a written informed consent
- Patients details will be collected
- Clinical and examinations findings are recorded

- Then, we classified patients according to Kurtzman and Stem (1990)³ classified axillary contractures on and anatomical basis.
 - Type IA: Injuries involving the anterior axillary fold.
 - Type IB: Injuries involving posterior axillary fold.
 - Type II: Injuries involving both anterior and posterior axillary folds.
 - Type III: Injuries type 2 plus axillary dome.
 - Type IV: Type III plus injury involving the chest wall.
- In our study, we used this classification.

Statistical analysis

Data will be entered into Microsoft Excel and Word was used to obtain various types of graphs such as bar diagram and Pie diagram.

RESULTS

In our study, the youngest member was a 2-year-old girl, and the oldest was a 70-year-old man. Max no. of patients 08 (40%) were in the age group of 21–30 years (Figure 1).

In our study of 20 patients of post-burn axillary contracture, five patients had Grade I (25%), Grade II 05 (25%), Grade III 01 (5%), and Grade IV 09 (45%) contractures.

In our study of 20 patients of post-burn axillary contracture, Z-plasty was done in 8 patients (40%), release with skin grafting 10 patients (50%), and local flap done in 2 patients (10%) (Figures 2-4).

In our study of 20 cases of post-burn axillary contractures—the mean degree of range of motion achieved after release of contracture was 120°.



Figure 1: Pre-operative picture of the patient with post-burn contracture of anterior axillary fold (grade IA)

In our study of 20 patients, 01 patient (05%) had a graft failure, 01 patient (05%) developed re-contraction while 90% of patients had no complications.



Figure 2: Intraoperative picture of the patient showing release with multiple z-plasty



Figure 3: Intraoperative picture of the patient showing release with multiple z-plasty (2)



Figure 4: Postoperative picture of the patient showing graft uptake

DISCUSSION

The present study comprises 20 cases who presented with post-burn contracture of axilla admitted from October 2021 to November 2022 in General Surgery and Plastic Surgery Unit in Maharani Laxmi Bai Medical College, Jhansi.

Clearly, the best treatment is prevention. Pandya and Mani⁴ state that there are two key elements in burn contracture prevention, namely, splinting of the burned area in its anatomic position and regular exercises through each joint's full range of motion.

Kwan and Ha^{5,6} provide an excellent description of the clinical rationale and considerations involved in choosing different splints to apply in upper-limb burns.

In our study of 20 cases of post-burn contractures, 12 (60%) were female and 08 (40%) were male (Table 1). The reason for the high percentage of female patients in comparison to male is that they are commonly involved in the kitchen work and most of the burn injuries occurs at home especially in the kitchen. Various possible risk factors are floor level cooking, substandard kerosene pressure stove, loosely worn garments (sarees and dupatta),

Table 1: Age-wise distribution

Age (in years)	Number of patients	Percentage
1-10	02	10.0
11-20	02	10.0
21-30	08	40.0
31-40	03	15.0
41-50	02	10.0
51-60	01	05.0
61-70	02	10.0
Total	20	100

Table 2: Grade-wise distribution of axillary contracture

Grade	Number of patients	Percentage
Grade I	05	25.0
Grade II	05	25.0
Grade III	01	05.0
Grade IV	09	45.0
Total	20	100

Table 3: Procedure-wise distribution for axillary contracture

Procedure	No of patients	Percentage
Z-plasty (Single or multiple)	08	40.0
Release with skin grafting	10	50.0
Local flap	02	10.0
Total	20	100

Table 4: Distribution according to the mean range of motion achieved after surgery

Normal Range of motion	Site of PBC	Mean Pre-operative angle	Mean maximum degree of range of motion 1 month after surgery	Mean maximum degree of range of motion 3 months after surgery	Mean % improvement
20°–180°	Axilla	70°	120° (90°–150°)	134°	58

Table 5: Complications

Complication	Number of patients	Percentage
Graft failure	01	05
Re-contracture	01	05
Total	20	100

low level electric plug points, table cloth over which hot food or beverages are kept, carelessly kept match boxes, substandard pressure cookers, etc.

Regarding post-burn contracture of axilla out of 20 patients, 5 patients (25%) belong to Grade I, 5 patients (25%) belong to Grade II, 1 patient (5%) belong to Grade III, and 9 patients (45%) belong to Grade IV (Table 2):

Similar study was done at Mansoura University Hospitals (October 1994 till October 1997). In this study, out of 35 patients, type I contracture constitute 10 patients (28.5%), type II contracture constitute 20 patient (57%), and type III and IV contracture constitute 5 patient (14.25%). In this study, most of the patient belong to type II (57%). This figure is not compatible with our study. Reason for this may be high incidence of females in our study who are mostly involved in kitchen work and also that most of the cases which are reported as accidental burns in females are actually suicidal and homicidal burns. Chest is usually involved in suicidal burn.

Similar study was done in burn unit in National Orthopedic Hospital, Enugu (2000–2004) out of 37 patient, Grade I include 31 patient, Grade II 4 patient, and Grades III and IV include 2 patient. Again this study was not compatible with our study, due to change in the trend as described above.

In our study of axillary contracture out of 20 patients, Z-plasty was done in 8 patients (40%), release and skin grafting done in 10 patients (50%), and local flap done in 2 patients (10%). Hence, in our study, release and skin grafting was the commonly used procedure (Table 3).

Study similar to ours was done in burn unit National Orthopedic Hospital, Enugu (2000–2004). In this study, out of 37 patient Z-plasty done in 12 patient, release and skin grafting done in six patient, local flap done in 23 patient. The reason for this change in trend is mainly because in our study patients of axillary contracture presented with

extensive axillary burn along with chest wall involvement, leaving it not suitable for Z-plasty or local flap.

Study was done in Department of Burn, Cairo University in the period between May 2002 and June 2006. Out of 20 patients, multiple Z-plasty was done in 5 patients (25%), local flap in 11 patients (55%), and release and skin grafting done in 4 patients (20%). This study was again not compatible with our study due to change in trend as mention above.

Evaluation of functional results after 3–6 months of follow-up showed that in patients of post-burn axillary contractures, the mean degree of range of motion achieved after release of contracture was 120° (Table 4).

In our study of 20 patients, 01 patient (05%) had a graft failure, 01 patient (05%) developed re-contracture while 90% of patients had no complications (Table 5).

Limitations of the study

In the absence of recent studies in literature evaluating the treatment modalities of axillary contracture; a systematic review or meta analysis was not possible. It is acknowledged that this is a limitation of this review that only provides authors expert opinion along with a collation of different publications on the topic.

CONCLUSION

Axillary scar contracture is a common complication of chest burns. Their management is mostly surgical by skin graft, local plasty, locoregional flap, or free flaps. Local and locoregional flaps when possible give better results and induce low risk of recurrences. Skin grafts are good alternative in wide wound after releasing but their main problem is skin graft loss due to difficulty of shoulder's immobilization. Surgery should be followed by early and prolonged physiotherapy for better functional results.

ACKNOWLEDGMENT

The authors would like to thank Department of General Surgery, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh.

REFERENCES

1. Gupta JL, Makhija LK and Bajaj SP. National programme for prevention of burn injuries. *Indian J Plast Surg.* 2010;43(Suppl):S6-S10.
<https://doi.org/10.4103/0970-0358.70716>
2. Schneider JC, Holavanahalli R, Helm P, Goldstein R and Kowalske K. Contractures in burn injury: Defining the problem. *J Burn Care Res.* 2006;27(4):508-514.
<https://doi.org/10.1097/01.bcr.0000225994.75744.9d>
3. Kurtzman IC and Stem PJ. Upper extremity burn contractures. *Hand Clinics.* 1990;261(2):261.
4. Mani MM and Chhatre M. Reconstruction of the burned lower extremity. *Clin Plast Surg.* 1992;19(3):693-703.
5. Jordan RB, Daher J and Wasil K. Splints and scar management for acute and reconstructive burn care. *Clin Plast Surg.* 2000;27(1):71-85.
6. Kwan MW and Ha KW. Splinting program for patients with burnt hand. *Hand Surg.* 2002;7(2):231-241.
<https://doi.org/10.1142/s0218810402001242>

Authors Contribution:

AG, SK, CG -Concept and design of the study, prepared first draft of manuscript; Interpreted the results; reviewed the literature and manuscript preparation; concept, coordination, preparation of manuscript and revision of the manuscript.

Work attributed to:

M. L. B. Medical College, Jhansi - 84128, Uttar Pradesh, India.

Orcid ID:

Akash Gupta - <https://orcid.org/0009-0000-7436-3443>

Sudhir Kumar - <https://orcid.org/0000-0002-2918-6668>

Chitrangana Gupta - <https://orcid.org/0009-0009-1238-915X>

Source of Support: Nil, **Conflicts of Interest:** None declared.