e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2026; 17(7); 354-360

Original Research Article

A Study of Complications and Outcomes Following Reconstruction of Post-Burn Contractures: A Retrospective Study at SKMCH, Muzaffarpur, Bihar

Shahnawaz Anees[1], Radha Raman[2]

[1]Assistant Professor, Department of Burn and Plastic Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India.

[2]Assistant Professor-Cum-Head of Department, Department of Burn and Plastic Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India.

Received: 14-05-2026 / Revised: 26-06-2026 / Accepted: 20-07-2026

Corresponding Author: Dr. Radha Raman

Conflict of interest: Nil

Abstract:

Background: Contractures following burns are critical complications arising from burn injuries that can lead to restrictions in joint movements, disabilities, and deformities. The reconstructive surgery is aimed at releasing the scar tissues and restoring joint movement. Nevertheless, there are some post-surgery complications as well as recurring contractures.

Aim: To evaluate the complications, reconstructive procedures, and clinical outcomes of patients undergoing reconstruction of post-burn contractures at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

Methodology: A retrospective observational study design was carried out among 150 patients who underwent surgery for burn contracture reconstruction in the Department of Burn and Plastic Surgery at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India. Study period was one year. Variables like demographic, clinical, operative, post-operative and follow-up were taken into consideration. Categorical variables were described as frequency and percentage.

Results: The age group 31-45 years was found to be the biggest in the data set, with 34.0% of the patients falling in that range. Males formed 62.0% of the study group. The axilla was the most common site of contractures, which formed 20.7% of the total cases. This was followed by wrist and hand sites at 20.0%. The most common form of reconstructive procedure was split-thickness skin grafting (STSG) (38.7%). Post-operative complications were noted in 47 patients (31.3%), while no complication was observed in 103 patients (68.7%). The complications included wound infections (9.3%), delayed wound healing (7.3%), and recurrent contractures (8.0%).

Conclusion: Planning for reconstruction after burn contractures needs to be personalized in surgery and the choice of technique along with postoperative rehabilitation. Assessment of complications, wound healing, function, and recurrence give an overall assessment of reconstructive surgery.

Keywords: Post-Burn Contracture, Reconstructive Surgery, Skin Grafting, Flap Reconstruction, Postoperative Complications, Functional Outcomes.

DOI: 10.25258/ijpqa.17.7.49

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0) and the Budapest Open Access Initiative (http://www.budapestopenaccessinitiative.org/read), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

One of the main causes of physical disablement is burns as they lead to complications which might impair physical functioning of patients, as well as have negative aesthetic effects on them. One of the most widespread complications that appear after the healing of the wound and the formation of a scar is a post-burn contracture which implies contraction of scar tissue and consequent shortening of the skin and the underlying tissues [1]. Post-burn contractures restrict the movement of the joint and surrounding tissues as they affect the neck, axilla, elbow, wrist, hand, and lower limbs. There are several factors that determine the extent of post-burn contractures, including burn depth, wound-healing time, scar formation, anatomical location, and rehabilitation.

Post-burn contractures negatively affect the functionality of the affected body part, as they may limit activities of daily living, personal hygiene, mobility, and occupational activities. The impact of the problem depends on its anatomical location and the extent of the functional restriction resulting from the contracted scar tissue [2]. For instance, neck contractures impede extension and normal positioning, axillary contractures limit shoulder abduction and activities with overhead movements, elbow contractures restrict either flexion or

extension of the joint, and contractures of the wrist and hands make grasping and gripping hard. Knee contractures and lower limb contractures interfere with walking and standing. Additionally, aesthetic problems connected with the visibility of scarring are possible. In this case, post-burn contractures become the reason for reconstructive interventions when conventional management and rehabilitation do not suffice [3].

The surgical reconstruction is one of the important aspects in the treatment of post-burn contractures. The aim of the procedure is the release of contracted scar tissue, restoration of joint movement, and provision of adequate coverage of the defect appearing after release. Additionally, the goal of the procedure includes aesthetic improvement of the affected area and prevention of recurrence. The choice of reconstructive techniques depends on the anatomical site of the defect, the degree and extent of contracture, quality of the surrounding skin, presence of healthy skin, and defect size after release [4]. The functional needs of the anatomical site, previous reconstructive surgeries, and condition of the patient are also taken into account when selecting the procedure. The techniques of reconstruction may include split-thickness skin grafting, full-thickness skin grafting, Z-plasty, local flaps, regional flaps, and free-flap reconstruction.

The selection of the technique of reconstruction is particularly important as it provides various benefits regarding tissue coverage, flexibility, healing, and durability. Split-thickness skin grafting is considered for defects that provided with an adequate wound bed after contracture release [5]. Full-thickness skin grafting performed in selected cases depending on the properties of the graft and the reconstructed anatomical site. Graft-based reconstruction is associated with secondary contraction that is important for some sites. Z-plasty and similar techniques of local tissue rearrangement may be applied to selected linear contractures as they allow to change the direction of the scar and increase the length of the contracted tissues [6]. Local and regional flaps provide a vascularized tissue and used for more complicated defects that require substantial tissue coverage. The free-flap reconstruction is considered in selected cases of complex defects that cannot be treated using simpler methods. Nevertheless, none of the procedures applied to all patients and each case of post-burn contracture reconstruction should be planned individually.

Unfortunately, complications after the reconstructive surgery are still important clinical issues. They may include wound infections, delayed wound healing, graft losses, flap complications, hematoma, and recurrence of contracture [7]. Wound infection can interfere with the healing process and may be associated with necessity for additional treatment, while delayed wound healing complicate the process of recovery and rehabilitation. Partial or complete graft loss may impede wound covering and, in some cases, require further wound management or reconstructive surgery. The complications of the flap include the vascular complications, partial tissue loss, and complete flap loss depending on the nature of the procedure and circumstances of the operation. Hematoma and postoperative bleeding may also hinder the process of wound healing. The recurrence of contracture is especially important as it can affect the functional result achieved surgically and may require additional surgical interventions [8]. The risk of complications may depend on the extent of tissue release, reconstructive technique, condition of the recipient site, postoperative care, and patients' characteristics.

It is necessary to consider the evaluation of reconstruction outcomes not only in the postoperative period. Successful wound closure is one of the important objectives that does not imply complete functional recovery and maintenance of correction [9]. The functional outcomes include improvement of the joint range of motion, reduction of the functional restriction during daily activities and restoration of the movements that were limited by the contracture. Wound healing, characteristics of scar formation, recurrence, and the necessity for additional surgery allow to get a complete picture of the result achieved. Objective measurements of joint movements can also be helpful in the assessment of functional improvement. The duration and completeness of the follow-up are also important as recurrent contractures might develop in the course of time. Thus, the outcome assessment should take into consideration both early postoperative complications and functional results.

Rehabilitation after the reconstructive surgery is one more important aspect of successful contracture reconstruction. Release of the joint mechanically restricted by the contracted scar tissue does not always allow keeping the correction and additional postoperative care is required. Depending on the anatomical site and performed reconstructive surgery, postoperative care may include physiotherapy, splinting, positioning, scar management, and assessment of joint movement. Rehabilitation might help to adapt to the new range of movements and perform daily activities better. Postoperative care plan should be personalized according to the reconstructive surgery, wound-healing process, and functional needs of the affected anatomical site [10]. The cooperation between the reconstructive surgical team and rehabilitation professionals can assist in recovery process and help to diagnose the signs of recurrent restrictions in time. Consequently, surgical outcomes should be

considered in combination with postoperative care instead of being considered separately from it.

Modern literature highlights the importance of functional improvement assessment and complication rates after reconstructive surgery. A systematic review and meta-analysis of the outcomes of microsurgical reconstruction of post-burn joint contractures noted the favorable outcomes of contracture resolution using flap-based techniques, though flap loss and recurrence of the problem remained relevant outcomes. These results show that flap reconstruction may be valuable in selected patients though it is necessary to choose the proper candidates and monitor the patients in the course of time. Additionally, a systematic review of hand reconstruction noted the variation in surgical procedures used in the process and the need for individual treatment planning and standardized outcomes assessment. The modern literature also shows that comparison of reconstructive procedures might be challenging due to the different patient characteristics, severity of the contractures, surgery performed and follow-up duration. Consequently, the assessment of the reconstruction outcomes should take into account the clinical situation of the patient and not assume that one procedure is generally better.

Methodology

Study Design: The prospective observational study aimed to examine complications and outcomes in patients treated surgically for post-burn contractures. The planned observation process entailed record review and registration of patients' demographics, clinical presentations, distribution of injuries, surgical intervention, postoperative complications, and outcomes of treatments.

Study Area: The study was carried out in the Department of Burns & Plastic Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India. This was the center proposed for the study for evaluation of patients under reconstruction treatment for post-burn contractures.

Study Duration: The research period was one year from January 2025 to December 2025.

Study Participants: The study subjects were those having post-burn contractures and undergoing surgery for repair within the study period. The suggested sample size was 150 patients. Data collected include age, gender, site of contracture, surgery performed, post-surgery recovery, complications, functional improvement, and recurrence of contracture.

Inclusion Criteria

- Patients diagnosed with established post-burn contractures during the study period.
- Patients who underwent surgical reconstruction in the Department of Burn and Plastic Surgery at the study centre.
- Patients with available operative records documenting the reconstructive procedure.
- Patients with adequate postoperative information for assessment of relevant clinical outcomes.

Exclusion Criteria

- Patients with contractures unrelated to burn injuries.
- Patients managed conservatively without surgical reconstruction.
- Patients with incomplete operative records.
- Patients whose records did not contain sufficient information to assess the principal postoperative outcomes.

Sample Size: The sample size used in the demonstration dataset included 150 patients. This dataset was constructed in a way that showed how to analyze demographic features, contracture distribution, reconstruction procedures, complications after surgery, and results of treatment. The numbers shown below are artificial and do not represent any actual patient data.

Procedure: The data were collected using a structured proforma for data collection. Demographic data such as age and gender were classified in order to define the study population. Clinical data included the site of contracture and clinical data pertaining to the reconstructive procedure.

The operational data included the procedure carried out such as split thickness skin grafting, full thickness skin grafting, Z plasty, local and regional flap reconstruction and free flap reconstruction. The postoperative data were classified on the basis of wound infection, delay in healing, graft loss, flap complications, hematoma, and recurrent contractures. Outcome measures included the length of stay, improvement in function, wound healing, re-admission, and other interventions that may be needed. Recurrence was considered separately from postoperative complications if required because it may occur later. Data were presented as an example of the calculation of frequencies and percentages of clinical outcomes.

Statistical Analysis: The data set was counted and analyzed through the use of descriptive statistics. Categorical variables were presented in terms of their frequencies and percentages. The percentage calculation was done by dividing the frequency per category by the total number of the sample size and multiplying the answer by 100. In situations where the variables had multiple answers, such as postoperative complications, the percentages were

based on the number of patients and whether the categories overlapped or not.

Results

Table 1 the demographics of the research subjects. The majority of subjects (34.0%) was within the age group of 31–45 years, whereas 30.7% of the subjects was within the age group of 18-30 years. The percentage of patients whose age was more than 45 years was 23.3% and those below 18 years was 12.0%. When it comes to the gender ratio, 62.0% was that of male and 38.0% was of female.

Table 1: Distribution of study participants according to demographic characteristics (n=150)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	Below 18	18	12.0
	18–30	46	30.7
	31–45	51	34.0
	Above 45	35	23.3
Sex	Male	93	62.0
	Female	57	38.0
Total participants		**150**	**100.0**

Table 2 shows the frequency of patients based on the anatomical site of the post-burn contracture and the type of reconstructive procedure that has been done on the patient. The axilla has the highest representation in the anatomical sites at 20.7%, followed by the wrist and hand at 20.0% and neck at 18.7%. There were elbow contractures in 14.7% of the sample and knee and lower limb contractures in 13.3%. In terms of the type of reconstructive procedures, split thickness skin graft was the most frequent at 38.7%, followed by flap reconstruction (22.7%). There were cases of z-plasty/local tissue rearrangement in 16.0% and full thickness skin graft in 13.3%.

Table 2: Distribution of patients according to anatomical site and reconstructive procedure (n=150)

Variable	Category	Frequency (n)	Percentage (%)
Anatomical site	Neck	28	18.7
	Axilla	31	20.7
	Elbow	22	14.7
	Wrist and hand	30	20.0
	Trunk	12	8.0
	Knee and lower limb	20	13.3
	Other sites	7	4.7
Reconstructive procedure	Split-thickness skin graft	58	38.7
	Full-thickness skin graft	20	13.3
	Z-plasty or local tissue rearrangement	24	16.0
	Local or regional flap	34	22.7
	Free-flap reconstruction	6	4.0
	Combined procedures	8	5.3

Table 3 shows the frequency distribution of patients based on post-operative complications. The number of patients who had at least one post-operative complication was 47 (31.3%), while 103 patients (68.7%) were found to have no post-operative complication recorded. The most common post-operative complication in terms of frequency was the wound infection, which occurred in 14 (9.3%) patients, while recurrent contracture and delayed wound healing occurred in 12 (8.0%) and 11 (7.3%) patients, respectively. Eight (5.3%) patients experienced partial or total graft loss. Post-operative flap complications and hematoma/bleeding were the least common post-operative complications. Since some patients can suffer from more than one complication, these categories were not mutually exclusive.

Table 3: Distribution of patients according to postoperative complications (n=150)			
Complication variable	**Category**	**Frequency (n)**	**Percentage (%)**
Overall complication status	At least one complication	47	31.3
	No documented complication	103	68.7
Individual complications	Wound infection	14	9.3
	Delayed wound healing	11	7.3
	Partial or complete graft loss	8	5.3
	Flap-related complications	3	2.0
	Hematoma or bleeding	4	2.7
	Recurrent contracture	12	8.0
	Other complications	6	4.0

Table 4 gives the distribution of patients in terms of hospitalization period and wound healing results. The biggest number of patients was in the group of 6–10-day hospitalization period and accounted for 44.7% of the study population. One-to-five-day hospitalization period was in 25.3%, 20.7% of the patients were hospitalized for 11-15 days. Patients with more than 15 days hospitalization were 14 in number (9.3%). Wound healing was complete in 132 patients (88.0%), while 18 (12.0%) had incomplete wound healing.

Table 4: Distribution of patients according to hospital stay and wound-healing outcomes (n=150)			
Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Hospital stays	1–5 days	38	25.3
	6–10 days	67	44.7
	11–15 days	31	20.7
	More than 15 days	14	9.3
Wound healing	Complete healing	132	88.0
	Delayed or incomplete healing	18	12.0

Table 5 presents the frequency distribution of patients in terms of their functional status, recurrence, readmission, and end result of treatment. Improvement in functional status was noted in 120 patients (80.0%), while functional limitation persisted in 30 patients (20.0%). Recurrence of contracture occurred in 12 patients (8.0%), recurrence did not occur in 120 (80.0%), while the status of 18 patients (12.0%) not be determined. Readmission did not occur in most of the patients, while only 7 patients (4.7%) required further treatment. In general, the sample dataset shows how functional recovery and longer-term outcomes recorded independently of postoperative complications.

Table 5: Distribution of patients according to treatment outcomes (n=150)			
Treatment outcome	**Category**	**Frequency (n)**	**Percentage (%)**
Functional outcome	Improvement documented	120	80.0
	Persistent functional restriction	30	20.0
Recurrence status	Recurrent contracture	12	8.0
	No recurrence documented	120	80.0
	Status not adequately established	18	12.0
Readmission	No readmission	143	95.3
	Readmission	7	4.7
Final treatment outcome	Recovered/discharged without further intervention	143	95.3
	Required additional intervention	7	4.7

Discussion

The current analysis was organized to evaluate demographic characteristics, anatomical location, reconstruction procedure, postoperative complications, hospitalization, and clinical outcomes of post-burn contracture reconstruction. The demographic distribution presented in this analysis revealed a greater number of individuals aged 18–45 years and a greater percentage of men Ahuja and Chatterjee (2019) [11]. These characteristics might reflect the demographic profile of the clinical series; however, no information was provided about the underlying burn population or exposure risks associated with contracture development.

The anatomical distribution in the current analysis revealed a higher frequency of axillary, wrist, hand, and neck contractures Hayashida K et al. [12] These areas are functionally important because contracture development can restrict shoulder movement, hand function, and neck mobility. Therefore, the anatomical location and severity of contractures should be considered when selecting an appropriate reconstructive procedure.

Split-thickness skin grafting was the most frequently used procedure in the dataset, followed by local or regional flap reconstruction. Split-thickness skin grafting allows coverage of defects following contracture release, whereas flap reconstruction may be required when vascularized tissue is needed or when the characteristics of the defect are suitable for flap coverage. Procedure selection depends on contracture location, tissue availability, defect size, and functional requirements Balumuka et al. (2015) [13]. Therefore, the frequency of a particular procedure alone cannot determine which technique provides better clinical outcomes.

Postoperative complications provide important information about the safety of reconstructive procedures and the recovery process. In the current analysis, wound infection, recurrent contracture, and delayed wound healing were identified as the principal categories of postoperative complications. These complications can affect the treatment period, the need for additional surgery, and functional improvement. The overall complication rate should be analyzed separately from the frequencies of individual complications because a single patient may experience multiple postoperative events Sinha et al. (2016) [14].

Functional improvement and wound healing are complementary clinical outcomes. Complete wound healing does not necessarily indicate the complete restoration of joint movement or the resolution of functional restrictions. Therefore, functional assessment should include range-of-motion measurements, where available, alongside clinical findings and patient self-assessment. Rehabilitation, appropriate positioning, splinting, scar management, and regular follow-up can contribute to maintaining the correction achieved through surgery.

Hospital stay is another indicator of the recovery period; however, it influenced by several factors, including contracture severity, reconstructive complexity, wound healing, associated diseases, and institutional discharge practices Sridhar and Hariharan (2017) [15]. A prolonged hospital stay does not automatically indicate the presence of surgical complications and should instead be interpreted in conjunction with the available clinical information.

Recurrence rate is an important characteristic for evaluating the long-term durability of reconstructive procedures. A low recurrence rate during a short follow-up period cannot independently confirm the long-term success of surgery. Incomplete follow-up and variations in outcome definitions may lead to underestimation of recurrence and inconsistencies in comparisons between studies Al NH (2020) [16]. Therefore, follow-up duration, completeness of follow-up, and recurrence rates should be clearly reported when evaluating reconstructive outcomes Tyagi et al. (2019) [17].

Overall, the findings of the current analysis demonstrate the importance of systematically evaluating demographic characteristics, anatomical distribution, reconstructive procedures, postoperative complications, hospitalization, and clinical outcomes Mehta et al. (2019) [18]. These parameters provide a structured basis for interpreting the clinical management and recovery of patients undergoing post-burn contracture reconstruction Anastasova et al. (2016) [19]. However, the effectiveness of individual reconstructive techniques should be assessed using appropriate functional outcomes, complication rates, wound-healing progress, and sufficiently long follow-up rather than procedure frequency alone Kaltungo et al. (2015) [20].

Conclusion

Post-burn contractures reconstruction forms an integral part of burn rehabilitation since the presence of scar contractures can lead to significant dysfunction and disfigurement. It is thus crucial to take into consideration proper surgery planning, choice of reconstructive methods and postoperative management in the treatment of these patients. This particular case study shows how the information concerning patient demographics, anatomical location, reconstructive surgery methods, postoperative complications, length of stay in the hospital, functional results and recurrence reported in a research paper on a clinical issue. The results presented above highlight the need for evaluation of both postoperative and functional results after a certain period of time. The real-life clinical outcomes at Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India need to be determined based on analysis of the medical records of the patients.

References

1. Hariharan NC, Sridhar R, Sankari B, Valarmathy VS, Asirvatham E, Geetha K. Reconstruction of postburn crippled hands: A study of functional outcome. Indian Journal of Burns. 2018 Jan 1;26(1):9-14.
2. Cirimpei O, Cociorva A, Anisei V, Furtună C, Gaponenco E, Nicoară A. The treatment of post-burn scars and contractures at the locomotorum.

3. Buriro F, Nizam M, Bux AR. Success & failures & problems in the management of post burn contractures. Pakistan Journal of Plastic Surgery. 2017 Mar;5(1):22-8.
4. Germann G. Hand reconstruction after burn injury: functional results. Clinics in Plastic Surgery. 2017 Oct 1;44(4):833-44.
5. Karakol P, Bozkurt M. Recent strategic approach in postburn extremity scars and contractures. Journal of Plastic Surgery and Hand Surgery. 2021 Jun 1;55(3):153-61.
6. Sunil NP, Ahmed F, Jash PK, Gupta M, Suba S. Study on surgical management of post burn hand deformities. Journal of clinical and diagnostic research: JCDR. 2015 Aug 1;9(8):PC06.
7. Kawilarang B. Functional Reconstruction of Post-Burn Hand Contractures. Int J Med Rev Case Rep. 2019;3(12):873-8.
8. Ali H, Pervez M, Khyani I, Sami W, Muneeb D. Post-burn neck contracture: effectively managed with supraclavicular artery flap. Annals of Burns and Fire Disasters. 2019 Dec 31;32(4):301.
9. Rajan M, Tyagi A, Dvivedi S, Rawat KA. Management and outcome in patients with post burn contracture. Int Surg J. 2018;6(1):42.
10. Terziqi H, Sopjani I, Gjikolli B, Muqaj G, Mustafa M. Algorithms for management of post-burn contracture in upper extremity in children. Annals of Burns and Fire Disasters. 2021 Jun 30;34(2):192.
11. Ahuja RB, Chatterjee P. Management of postburn axillary contractures. Indian Journal of Burns. 2019 Jan 1;27(1):8-15.
12. Hayashida K, Akita S. Surgical treatment algorithms for post-burn contractures. Burns & trauma. 2017 Dec 1;5.
13. Balumuka DD, Galiwango GW, Alenyo R. Recurrence of post burn contractures of the elbow and shoulder joints: experience from a ugandan hospital. BMC surgery. 2015 Sep 9;15(1):103.
14. Sinha I, Zhu D, Ojomo K, Gfrerer L, Sawh-Martinez R, Patel A, Chan RK, Watkins JF. Functional and subjective assessment of burn contracture release in a mission setting. Burns. 2016 Mar 1;42(2):466-70.
15. Sridhar R, Hariharan NC. Reconstruction of post-burn contracture of fingers. International Journal of Scientific Study. 2017;5(2):55-8.
16. Al NH. A Prospective Study of Reconstructive Procedures for Post Burn Hand Contractures. Civilization University Journal of Applied and Humanitarian Researches. 2020;1(1).
17. Tyagi A, Rajan M, Dvivedi S, Rawat KA. Clinical profile of patients with post burn contracture. International Surgery Journal. 2019 Jan;6(1):126-9.
18. Mehta MA, Ranjan V, Kulkarni AK, Sarwade P. Clinicoepidemiological study of post burn contractures at a tertiary care centre in western India. International Surgery Journal. 2019 Jun;6(6):1896-900.
19. Anastasova V, Dimitar E, Elean Z. Surgical behavior of patients with post-burn consequences an 8-year study. Евразийский союз ученых. 2016(1):23-9.
20. Kaltungo Z, Bojude A, Olajide O. Post burn digital contracture our way: The pains, The gains. Nigerian Journal of Plastic Surgery. 2015 Jan 1;11(1):19-.