Section: Plastic Surgery

Original Research Article

MANAGEMENT OF POST-BURN SEQUELAE IN OUR TERTIARY CARE CENTER

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ABSTRACT

Background: Burn injuries are a significant cause of long-term morbidity, with many survivors developing functional and aesthetic complications. Post-burn sequelae such as contractures, hypertrophic scars, and deformities adversely affect quality of life. Effective surgical and non-surgical management is critical in improving patient outcomes.[1,2] **Objective:** To evaluate the types of post-burn sequelae, demographic profiles, surgical interventions, and clinical outcomes in patients treated at our tertiary care center. **Materials and Methods:** This retrospective observational study included 76 patients with post-burn sequelae treated at Government General Hospital, Guntur, from April 2022 to May 2024. Patient demographics, type and site of sequelae, treatment modalities, complications, and outcomes were recorded. Interventions included contracture release with split-thickness skin grafting (SSG), Z-plasties, scar excision with flap or graft, fat grafting, and PRP therapy.[3,4,5] **Result:** The majority of patients were female (63.2%), aged 1 to 71 years. Thermal burns were the most common cause (78.9%). Upper limb contractures were the most frequent sequelae (70%). Contracture release with SSG was the most commonly performed procedure. Postoperative complications were minimal, with good graft uptake in most cases. PRP and fat grafting showed promising results in selected patients.[6,7] Follow-up ranged from 6 months to 1 year, with stable results and high patient satisfaction. **Conclusion:** Post-burn sequelae significantly affect function and appearance, especially in the upper limbs. Early surgical intervention with appropriate technique yields excellent outcomes. Adjuncts like PRP and fat grafting improve scar quality and aesthetic outcomes. Comprehensive management tailored to patient needs is essential in post-burn rehabilitation.[8,9,10]

INTRODUCTION

Burn injuries are among the most devastating forms of trauma, often resulting in long-term physical, functional, and psychological sequelae. While the acute management of burns has significantly advanced over the years, post-burn complications continue to pose major challenges in both developed and developing healthcare settings.[1] The most commonly encountered sequelae include contractures, hypertrophic scars, keloids, pigmentation disorders, and deformities involving functional and cosmetic impairments.[2,3]

Post-burn contractures, especially in the upper limbs and joints, can severely affect mobility, interfere with daily activities, and impair quality of life 4. Similarly, facial burns may lead to microstomia, ectropion, or functional vision issues, significantly impacting psychosocial well-being 5. Children and young adults are particularly vulnerable due to their active growth and longer life expectancy post-injury.[6]

Management of these sequelae is multidisciplinary and may involve surgical techniques such as contracture release, split-thickness skin grafting (SSG), local or regional flaps, Z-plasties, and more recently, adjunctive therapies such as fat grafting and platelet-rich plasma (PRP).[7,8] Topical agent like Trimacilone used in addition to Pressure garments & Silicon Sheets.[9] However, outcomes vary depending on the severity of deformity, site involved, timing of intervention, and postoperative care. Our finding are that management of post burn sequelae is often a complex process and plan to be customized for each patients combining various available methods.

There is limited consolidated data from Indian tertiary care centers documenting the pattern, treatment, and outcomes of post-burn sequelae. This study aims to analyze the spectrum of post-burn

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complications encountered in our center over a two-year period, the surgical and non-surgical interventions employed, and the clinical outcomes observed.

MATERIALS AND METHODS

Study Design and Setting

This is a retrospective observational study conducted at a tertiary care center, GGH, Guntur, over two years, from **April 2022 to May 2024**. The study included all patients who presented to the plastic surgery department with post-burn sequelae and underwent surgical or non-surgical management during this period.

Inclusion Criteria

- Patients of all age groups and genders
- Patients with functional or cosmetic sequelae following thermal, scald, or electrical burns
- Patients who underwent active management (surgical or non-surgical) for post-burn sequelae
- Minimum follow-up of 6 months

Exclusion Criteria

- Patients with acute burns
- Patients lost to follow-up before 6 months
- Patients with comorbidities that contraindicated surgical intervention

Data Collection

Patient data was collected from hospital records, including demographics, burn characteristics (type, cause, anatomical site), type of post-burn sequelae, surgical and non-surgical treatments, complications, and outcomes. Follow-up records were reviewed for outcome assessment.

Variables Analyzed

- Age and gender distribution
- Type and cause of burn injuries
- Type and site of sequelae
- Procedures performed
- Postoperative complications
- Functional and aesthetic outcomes
- Follow-up duration

Treatment Modalities

The interventions performed included:

- **Contracture release** with or without **K-wire fixation** and **split-thickness skin grafting (SSG)**
- **Z-plasties** for linear contractures
- **Scar excision** followed by **SSG** or **flap cover**
- **Fat grafting** and **PRP + fat grafting** for scar remodeling
- **Microstomia release** and **lateral tarsorrhaphy** for facial deformities
- **Scar revision surgeries** for aesthetic improvement

Outcome Assessment

Outcomes were evaluated clinically based on:

- Graft/flap take
- Range of motion improvement (for contractures)
- Cosmetic appearance (subjective and clinical evaluation)
- Patient satisfaction
- Recurrence or need for repeat intervention

Complications such as graft loss, need for revision surgery, and suboptimal responses were also documented.

RESULTS

Patient Demographics

A total of **76 patients** with post-burn sequelae were included in the study. The **age** of patients ranged from **1 year to 71 years**, with a higher incidence observed in younger age groups. There were **28 males** and **48 females**, indicating a female predominance.

Burn Etiology and Cause

- **Type of burn injury:**
  - Thermal burns: 60 patients (78.9%)
  - Scald burns: 10 patients (13.2%)
  - Electrical burns: 06 patients (7.9%)
- **Cause of burns:**
  - Accidental: 70 patients (92.1%)
  - Suicidal: 06 patients (7.9%)

Types of Sequelae Observed

The most common sequelae encountered were **post-burn contractures**, affecting **70 patients (92.1%)**. Other sequelae included:

- Contractures with associated scars: 12 patients
- Scars alone: 03 patients
- Keloids: 03 patients
- Syndactyly: 04 patients
- Microstomia: 02 patients
- Hypopigmented scar: 01 patient

Anatomical Sites Involved

- Upper limbs were the most frequently affected site, involved in **53 patients (69.7%)**
- Head and neck: 08 patients
- Trunk: 03 patients
- Lower limbs: 02 patients
- Groin: 01 patient

Surgical and Non-Surgical Interventions

Various reconstructive procedures were performed based on the type and severity of deformity. The most common surgical intervention was **contracture release with K-wire fixation and SSG**, performed in **48 patients**. The complete list of procedures includes:

Table 1: surgical procedure

Procedure	Number of Patients
Contracture release + K-wire + SSG	48
Contracture release + SSG	37
Multiple Z-plasties	12

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Scar excision + SSG	05
Scar excision + flap cover	06
Fat grafting	02
PRP + fat grafting	09
Scar revision	01
Microstomia release	02
Lateral tarsorrhaphy	01

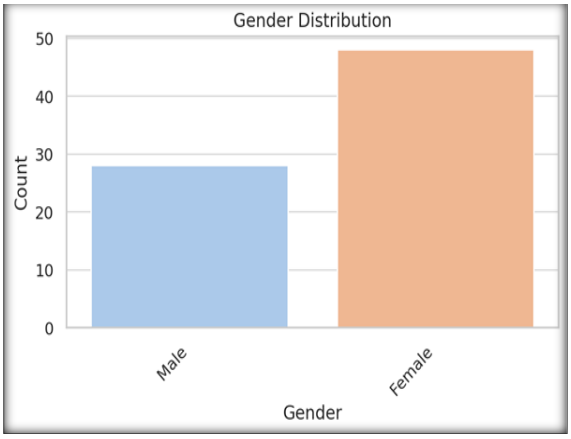
Note: Some patients underwent more than one procedure.

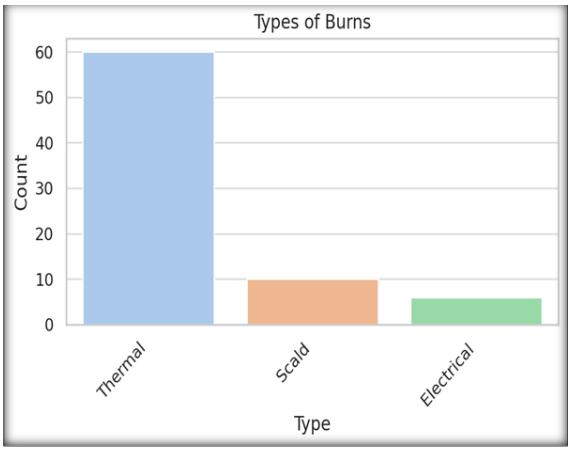
Complications and Outcomes

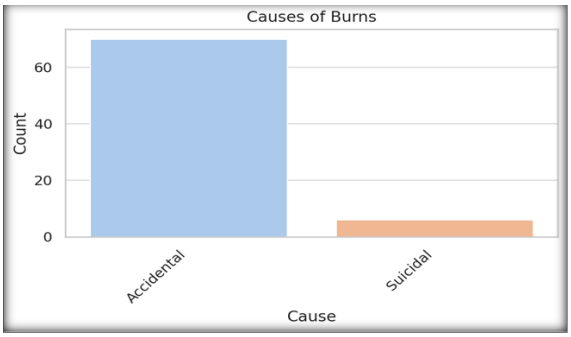
- **Partial graft loss** was noted in **15 patients**, most of whom recovered with conservative management.
- **Redo grafting** was necessary in **1 patient**.
- **No flap losses** were reported.
- Among **patients with keloids**, improvement was suboptimal, particularly when managed on an outpatient basis.
- **PRP + fat grafting** showed:
  - Good outcomes in 5 patients
  - Moderate outcomes in 4 patients
- **Fat grafting alone** showed good improvement in both cases.

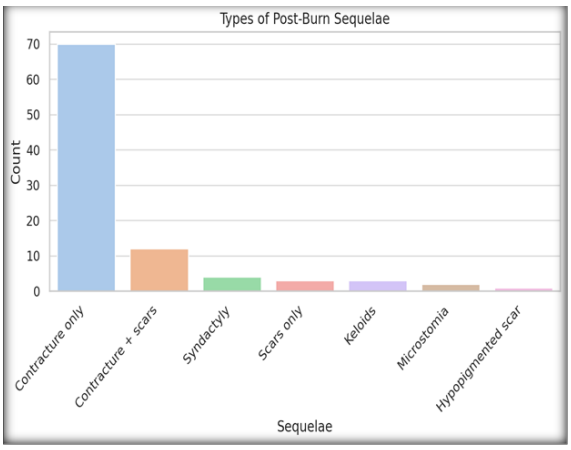
Follow-Up

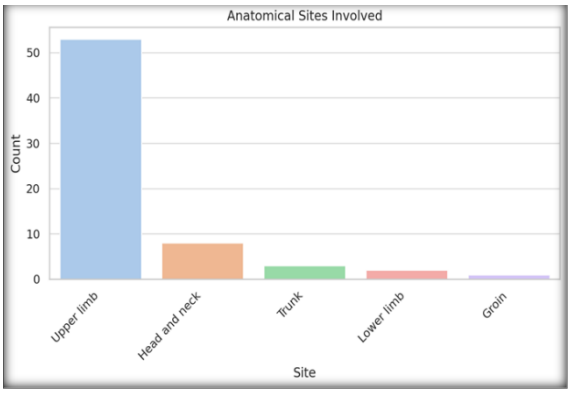
Patients were followed up for a duration ranging from **6 months to 1 year**. Most surgical outcomes remained stable with no significant recurrence of contracture during the follow-up period.

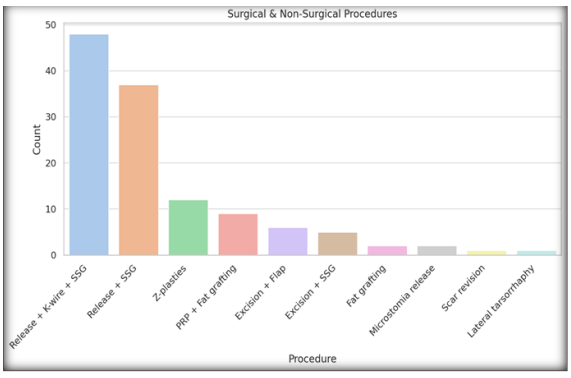












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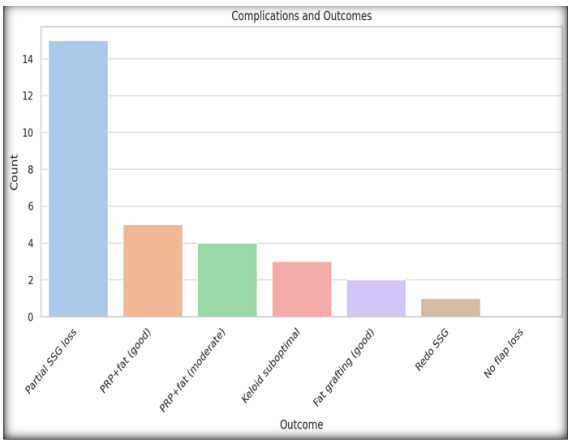

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DISCUSSION

Post-burn sequelae continue to pose a significant challenge in reconstructive surgery, particularly in resource-limited settings.[1,2] Our retrospective study of 76 patients over two years highlights demographic trends, types of sequelae encountered, and outcomes of various surgical interventions performed at our tertiary care center.

Demographics and Burn Characteristics

A female preponderance (63%) was noted, with the majority of burns being thermal in origin (79%). This is consistent with similar studies in developing countries, where domestic burns are common. The predominant cause was accidental (92%), underscoring the need for improved public awareness and preventive measures.[3,4]

Types and Sites of Sequelae

Contractures were the most common sequela (92%), with the upper limb being the most frequently involved anatomical region (69.7%). This pattern can be attributed to the functional importance and frequent exposure of the hands and arms during thermal accidents.[3,4] Combined contracture and scar deformities (15.8%) and isolated keloids or syndactyly were less common but still clinically significant.

Surgical Management and Outcomes

The most frequently performed procedures were contracture release with split-thickness skin grafting (SSG) with or without K-wire fixation. These methods provided satisfactory outcomes in most patients. Z-plasties were employed in selected cases requiring local tissue rearrangement, while flap cover was reserved for scar excision in cases with poor vascular beds or deeper contractures.[5,6]

Fat grafting and platelet-rich plasma (PRP) combined with fat grafting showed promising results in improving scar pliability and aesthetics, with good outcomes in a subset of patients.[7,8] Platelet-rich plasma (PRP) is a plasma variant characterised by a high concentration of plasma components, obtained through centrifugation of fresh whole blood. Platelets in PRP are activated to release various growth factors and other substances that play an important role in wound repair by promoting cell chemotaxis, cell adhesion, cell division and proliferation and angiogenesis.[9] However, the improvement in keloids was suboptimal, requiring ongoing outpatient-based therapy and follow-up.

Complications

Partial SSG loss occurred in 19.7% of cases, but required re-grafting in only one patient. No flap losses were reported, reflecting good surgical planning and execution. Patients undergoing PRP + fat grafting showed variable results, highlighting the importance of patient selection and repeated sessions.

Follow-Up

The follow-up period ranged from 6 months to 1 year, sufficient to assess early outcomes but not long enough to evaluate long-term recurrence of contractures or scar maturation.

Limitations

The study's limitations include its retrospective design, relatively small sample size, and lack of objective scoring for functional outcomes and scar assessment. A longer follow-up with validated scar scoring systems (e.g., Vancouver Scar Scale) could strengthen future research.

CONCLUSION

Post-burn sequelae continue to significantly impact patients' quality of life, particularly in developing settings where access to early burn care and rehabilitation may be limited. Our experience over two years highlights that:

- **Contractures**, especially of the upper limbs, are the most common sequelae requiring intervention.
- **Timely surgical management** using techniques such as contracture release with SSG, Z-plasty, and flap cover can restore function and improve aesthetics.
- **Adjunctive procedures** like fat grafting and PRP show promise in scar remodeling, though outcomes in **keloid management** remain inconsistent.
- A **multidisciplinary, individualized approach**, along with long-term follow-up, is essential for optimal rehabilitation of post-burn patients.

Preventive strategies, public education, early intervention, and rehabilitation programs should be emphasized to reduce the burden of post-burn deformities.[10,11]

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