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A RETROSPECTIVE ANALYSIS OF POST-BURN CONTRACTURES: INCIDENCE, DISTRIBUTION, AND SURGICAL MANAGEMENT AT A TERTIARY CARE CENTRE OVER THE PAST 5 YEARS

Plastic Surgery

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ABSTRACT

Background: Post-burn contractures (PBCs) represent one of the most common and debilitating late complications of burn injuries. They result from wound contraction and pathological scarring, particularly when burns involve joints or cosmetically important regions. Despite advances in acute burn care, post-burn contractures continue to impose significant functional, psychological, and socioeconomic burden, especially in developing countries. **Objectives:** To study the incidence, anatomical distribution, clinical profile, and surgical management of post-burn contractures treated at a tertiary care teaching hospital over a five-year period. **Methods:** This retrospective descriptive study was conducted at Victoria Hospital, Bangalore Medical College and Research Institute (BMCRI), Bengaluru, from January 2021 to December 2025. A total of 326 patients who underwent surgical management for post-burn contractures were included. Data regarding age, gender, etiology of burns, anatomical site, type of contracture, surgical procedure performed, and postoperative outcomes were collected from medical records and analyzed. **Results:** The most commonly affected age group was 21–40 years, with a male predominance. The hand and digits were the most frequent sites of contracture (40.1%), followed by the neck (16.5%), axilla (12.2%), elbow (12.2%), knee (7%), groin and foot (6.7%), and non-joint contractures (4.9%). Flame burns were the most common etiology. The majority of patients were treated with contracture release followed by split-thickness skin grafting. Full-thickness skin grafts and Z-plasty were preferred for facial and finger contractures, while flap coverage was used for joints with exposed vital structures. Postoperative splinting and physiotherapy played a crucial role in maintaining correction and preventing recurrence. **Conclusion:** Post-burn contractures remain a preventable yet prevalent complication of burn injuries. Early excision and skin grafting, appropriate timing of reconstructive surgery, and meticulous postoperative rehabilitation are essential for achieving optimal functional outcomes.

KEYWORDS

Post-burn Contracture, Burn Reconstruction, Skin Grafting, Splinting, Physiotherapy

INTRODUCTION

Burn injuries continue to be a major public health problem in developing countries, contributing significantly to morbidity and long-term disability. Post-burn contracture is one of the most common late sequelae of burn injury and arises due to excessive wound contraction and abnormal scar maturation. Contractures may involve joints, leading to restriction of movement and functional disability, or non-joint areas, resulting in aesthetic deformities and psychological distress.

The incidence and severity of post-burn contractures are influenced by multiple factors, including depth and extent of burn, delayed wound closure, infection, inadequate splinting, and poor compliance with physiotherapy. Although many contractures are preventable with appropriate acute burn care, they continue to be encountered frequently in clinical practice due to delayed presentation, limited access to specialized burn care, and socioeconomic constraints.

This study aims to analyze the incidence, distribution, and management of post-burn contractures treated at a tertiary care hospital over a five-year period and to highlight the importance of preventive strategies and standardized surgical principles in their management.

Pathophysiology of Post-burn Contractures

Healing of burn wounds occurs through restitution or substitution depending on the depth of injury. Superficial burns involving the epidermis and superficial dermis heal by restitution with minimal scarring. However, deeper burns involving the reticular dermis or full-thickness skin loss heal by substitution, characterized by deposition of unspecialized connective tissue.

Full-thickness skin loss results in wound contraction due to myofibroblast activity, with epithelialization occurring from wound margins. When this contraction occurs across joints or mobile anatomical regions, it leads to the development of contractures. Prolonged inflammation, infection, and delayed wound closure further exacerbate scar hypertrophy and contracture formation.

MATERIALS AND METHODS

This retrospective descriptive study was conducted in the Department of Plastic Surgery, Victoria Hospital, BMCRI, Bengaluru. Medical records of patients treated surgically for post-burn contractures between January 2021 and December 2025 were reviewed. A total of 326 patients were included in the study.

Inclusion criteria were patients of all age groups with established post-burn contractures requiring surgical intervention. Patients with acute burns, electrical contractures, or incomplete records were excluded. Data collected included demographic details, etiology of burn, anatomical site of contracture, duration since burn injury, surgical procedure performed, and postoperative outcome.

Surgical Management Principles

Definitive correction of post-burn contractures was usually delayed for at least one year after burn wound healing to allow scar maturation, except in urgent situations such as eyelid contractures threatening corneal exposure, severe neck contractures impairing vision, neurovascular compromise, and crippling hand contractures.

The fundamental principle of surgical management was complete release of the contracture along the line of maximum tension, usually opposite to the joint line, extending down to unscarred tissue. Excision of scar tissue was avoided whenever possible, with preference given to release rather than excision. Skin cover was provided using split-thickness skin grafts, full-thickness skin grafts, Z-plasty, or flap reconstruction depending on the site and depth of defect.

Postoperative Care and Rehabilitation

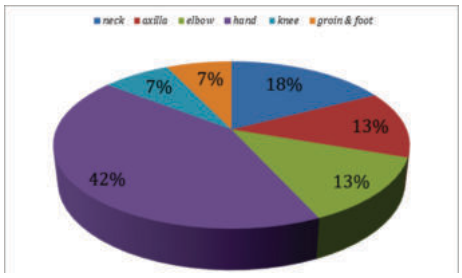
Maintenance of the corrected position was ensured using static or dynamic splints until grafts had healed, usually for three weeks. Physiotherapy was initiated early and continued until graft maturation and restoration of full range of motion. Patient compliance with splinting and physiotherapy was emphasized to prevent recurrence.

RESULTS

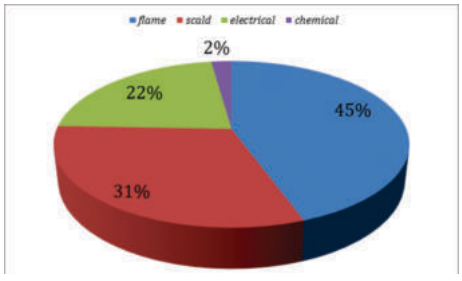
Among the 326 patients studied, the majority belonged to the 21–40 year age group. Males were more commonly affected than females. Hands and fingers constituted the most common site of post-burn contracture. Release and split-thickness skin grafting was the most frequently performed procedure. Functional outcomes were

satisfactory in most patients, with recurrence primarily observed in cases of poor compliance with splinting and physiotherapy.

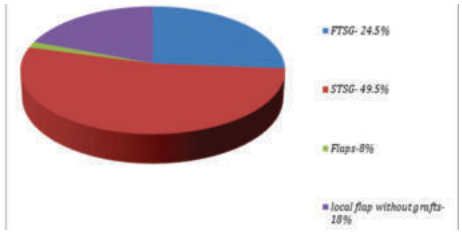
Common location of PBC

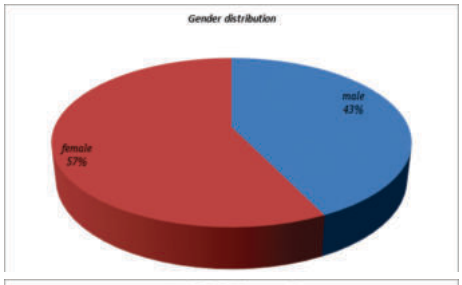


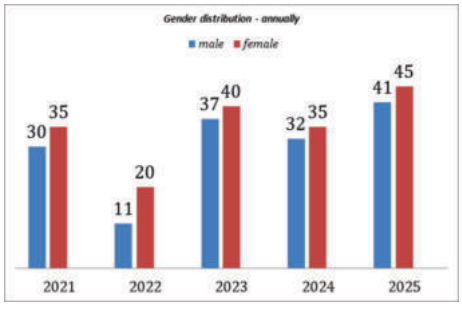
Etiology of Burns



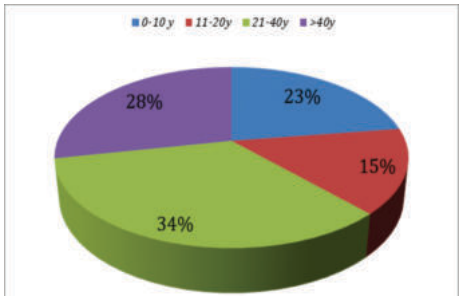
Modes of Treatment







Age Distribution



PBC Lip

PBC Neck

PBC Axilla

PBC Elbow- Release By Z- Plasty

PBC Elbow- Release + STSG

PBC Hand- Groin Flap

PBC Hand- Release + STSG

PBC First Web Space –release By Z-plasty

PBC- Right Little Finger

PBC Knee

PBC Foot

DISCUSSION

Post-burn contractures are largely preventable complications. Early excision and skin grafting during the acute phase of burn injury significantly reduce the incidence of contractures. Proper positioning, splinting, and physiotherapy from the acute stage are essential preventive measures.

Surgical correction requires meticulous planning, adherence to established principles, and a multidisciplinary approach involving surgeons, physiotherapists, and occupational therapists. The choice of reconstructive technique should be individualized based on the anatomical site, severity of contracture, and availability of local tissues.

PARAMETER	Tyagi et al.	Adu et al,	Our study
Gender (M:F)	0.96:1	1.83:1	0.75:1
Neck	11.1%	11.89%	16.5%
Axilla	2.2%	11.9%	12.2%
Elbow	55.5%	11.9%	12.2%
Hand and fingers	13.3%	43.5%	40.1%
Lower limb and groin	13.3%	18.42%	13.7%
STSG		37%	49.5%
Other procedures		45.2%	50.5%
Age	Max- 10-20y	Max- 21-40 y	Max-21-40y

CONCLUSION

Post-burn contractures continue to pose a significant reconstructive challenge. Prevention remains the most effective strategy. Early burn wound closure, timely surgical intervention, and rigorous postoperative rehabilitation are the cornerstones of successful management.

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