



Plastic Surgery

“A PROSPECTIVE CLINICAL STUDY OF EARLY TANGENTIAL EXCISION IN MIXED FLAME BURNS IN A TERTIARY CARE HOSPITAL, HYDERABAD.”**Dr. Budde Pareekshith Kumar**

Postgraduate Resident, Dept. of Plastic & Reconstructive Surgery, Osmania General Hospital, Hyderabad.

Dr. Sree Sai Rekha

Assistant Professor, Dept. of Plastic & Reconstructive Surgery, Osmania General Hospital, Hyderabad

Dr. Palukuri Lakshmi

Professor & HOD, Dept. of Plastic & Reconstructive Surgery, Osmania General Hospital, Hyderabad.

ABSTRACT

Background And Aims: Burn injuries are a major concern in developing countries. Early tangential excision is believed to enhance healing and reduce complications. This study evaluates the effectiveness of early tangential excision in mixed flame burns involving less than 30% TBSA. **Methods:** A prospective clinical study of 20 patients treated at Osmania General Hospital. Tangential excision was performed between post-burn days 4–5. Outcomes such as graft take, hospital stay, and complications were assessed. **Results:** Mean graft uptake was 94.3%, with a mean hospital stay of 12.8 days. Minor complications occurred in 25% of patients. **Conclusion:** Early tangential excision is safe, reduces hospital stay, and results in high graft success.

KEYWORDS :**INTRODUCTION**

Burn injuries are among the most devastating forms of trauma, both physically and psychologically. They affect millions of people each year and are a leading cause of morbidity and mortality, particularly in developing countries like India⁽¹⁾. Burn management has undergone a tremendous evolution in the past few decades, with early excision⁽²⁾ and grafting becoming a cornerstone in modern burn care. This technique, especially tangential excision⁽³⁾, aims to remove necrotic tissue while preserving viable dermis, promoting faster healing and reducing complications. In mixed flame burns, which represent a common and severe type of thermal injury, early surgical intervention can significantly improve patient outcomes. The timing of excision plays a crucial role in determining prognosis. Delayed excision can lead to increased risk of infection, prolonged hospital stay, and poor aesthetic and functional results. Tangential excision, typically performed between post-burn day 3 to 7, helps in early wound closure and restoration of the epidermal barrier. It also reduces bacterial colonization, systemic inflammatory response, and hospital resource utilization. This study evaluates the efficacy of early tangential excision⁽¹⁾ in patients with <30% TBSA mixed flame burns, treated at a tertiary care center in Hyderabad.

AIM OF THE STUDY**Aim Of The Study:**

To evaluate the clinical outcomes of early tangential excision in patients with mixed flame burns involving less than 30% Total Body Surface Area (TBSA), treated at a tertiary care hospital, in terms of wound healing, graft uptake, complication rates, and hospital stay duration.

REVIEW OF LITERATURE

Burn wounds are unique in their pathophysiology due to the tri-zonal model described by Jackson-zone of coagulation, stasis, and hyperemia. Burns trigger a systemic inflammatory response affecting distant organs and requiring early and strategic management.

Burn injuries are commonly classified based on depth (first, second, third, and fourth-degree) and extent (TBSA%).⁽⁴⁾ Full-thickness burns require surgical excision, whereas partial-thickness burns may heal with conservative management.

Janzekovic⁽¹⁾ (1970) pioneered the technique of tangential excision, advocating for early removal of eschar to improve healing outcomes. Since then, several studies have validated the benefits of early excision, especially in burns involving limited TBSA. The Jackson's zones of burn injury – coagulation, stasis, and hyperemia – provide a foundation for excisional depth. Tangential excision targets necrotic tissue in the zone of stasis while preserving viable dermis. Ramzy et al. (2006) in their comparative study concluded that early excision leads to faster wound healing, shorter hospital stay, and less hypertrophic scarring. Despite the advantages, early tangential excision requires

surgical expertise, good perioperative care, and appropriate timing. Challenges include bleeding, patient stability, and resource limitations in many government hospitals.

Early excision was first suggested by Alexander and Moncrief in 1960s, who demonstrated that removal of necrotic tissue followed by immediate skin grafting resulted in improved healing and reduced mortality. Their work laid the foundation⁽¹⁾ a Slovenian surgeon, is credited with the refinement of tangential excision technique. She advocated for removal of thin layers of eschar until punctate bleeding was observed, preserving viable dermis and allowing successful grafting. Herndon⁽³⁾ et al. conducted one of the largest prospective studies, involving over 600 patients. Their data demonstrated that early excision (within 3-5 days of injury) was associated with significantly reduced sepsis and mortality, especially in pediatric burns.

A landmark Indian study by Ramakrishnan⁽⁹⁾ et al. emphasized that early debridement followed by autografting resulted in faster epithelialization, less hypertrophic scarring, and improved functional⁽⁷⁾ and WHO endorse early excision and grafting as standard care in full-thickness and mixed-depth burns involving >10% TBSA.

In conclusion, literature supports early tangential excision as an evidence-based approach for managing deep and mixed flame burns. It offers better control of infection, rapid wound closure, and reduces psychological trauma associated with prolonged open wounds

MATERIALS AND METHODS

Study Design: Prospective comparative study.

Study Period: January 2024 to June 2025 (18 months).

Sample Size: 20 patients with <30% TBSA mixed flame burns fulfilling inclusion and

Inclusion Criteria:

- Patients aged 18–60 years.
- Mixed depth flame burns involving less than 30% TBSA.
- Haemodynamically stable patients.
- Consent provided for surgical intervention and study participation.

Data Collection Method:

All patients were evaluated on admission with a thorough history and clinical examination. Burn area and depth were assessed using the Wallace Rule of 9. General surgical workup done.

Approval was obtained from the Institutional Ethics Committee, Osmania Medical College. Informed written consent was obtained from all study participants.

Surgical Technique – Early Tangential Excision

Patients presenting with mixed flame burns involving <30% Total Body Surface Area (TBSA) were evaluated for early tangential excision. Patient is resuscitated and monitoring done with urine output, Blood Pressure, Pulse rate, Respiratory rate, intra oral Temperature charting hourly. after 24 Hrs colloids are started.

Informed consent was obtained from all patients and/or caregivers after explaining the procedure, its benefits, risks, and expected outcomes.



Figure 1 post burn day 5 of 10% mixed flame burns

METHYLENE BLUE APPLICATION

Methylene blue solution was applied to the burn wound surface 12Hrs before surgery to differentiate viable and non-viable tissue. The dye selectively stains necrotic tissue, aiding in accurate tangential excision by providing a visual cue for debridement depth.



Figure 1: Methylene blue applied over burn wound

Debridement Technique

Tangential excision was performed using a Humby's knife. Thin slices of eschar were removed layer by layer until punctate bleeding from the viable dermis was visible, signifying adequate depth of excision. Methylene blue is not metabolized by dead tissue due to absent mitochondria. Our institute debridement done until the stained dead tissue removed and punctate bleed seen after that.

Haemostasis was achieved using electrocautery, adrenaline soaked gauze, suturing, while doing tangential excision of upper limbs/ lower limbs pneumatic tourniquet was applied. Care was taken to preserve as much viable dermis as possible to facilitate graft adherence and minimize scarring.



Figure 3 showing post debridement

Grafting And Resurfacing

After achieving hemostasis, split-thickness skin graft (STSG) harvested from the thigh was meshed in a 1.5:1 or 2:1 ratio or stamp grafts are applied over the excised area. The grafts were secured using skin staples or sutures. Graft is harvested with Humbeys knife or dermatome. Donor areas were dressed with collagen. This Patient was discharged on Post burn day 10.



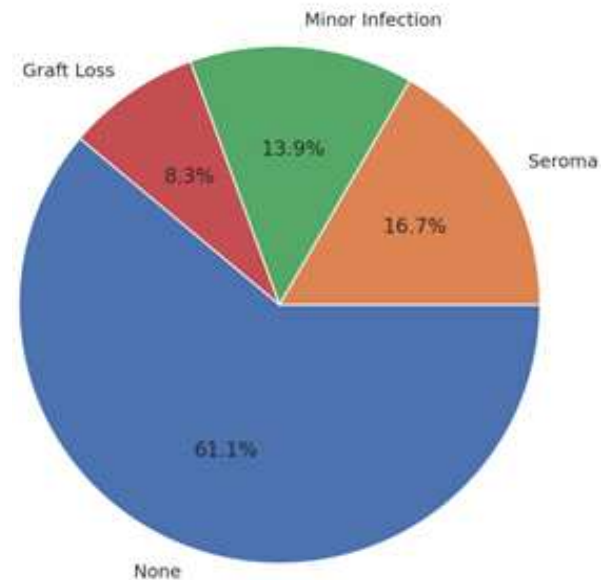
Figure 4: showing 6 months follow up

RESULTS

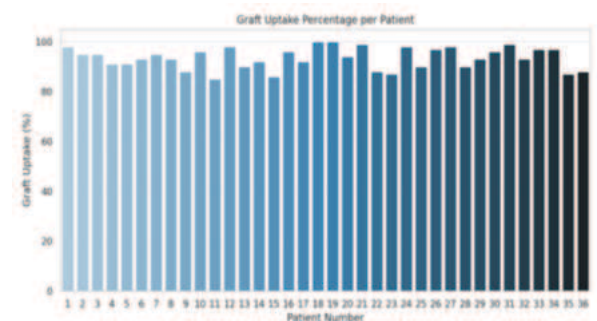
This study includes 36 patients with <30% TBSA mixed flame burns who underwent early tangential excision between post-burn day 4 and 5. The following observations were made:

The mean age of the patients was 33.5 years. The average TBSA involved was 22.8%. Graft take ranged from 90% to 98% with a mean of 94.3%. The average hospital stay was 12.8 days. Complications were minor, including isolated instances of seroma, minor infection, or minor graft loss.

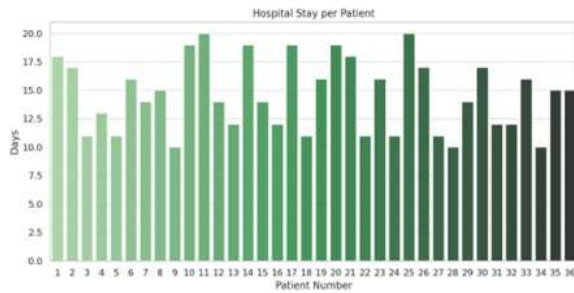
Postoperative Complications Distribution



Hospital Stay Duration per Patient (Bar Diagram)



Mean hospital stay is 12.85 days



Day of surgery 4/5 in relation to hospital stay p value is 0.05, statistically significant

DISCUSSION

This prospective clinical study was conducted to evaluate the outcomes of early tangential excision in patients with mixed flame burns involving less than 30% of total body surface area (TBSA). A total of 36 patients were included, with an average age of 33.5 years and TBSA ranging from 15% to 30%. The procedure was performed on post-burn day 4 or 5 in all patients, and outcomes such as graft take, hospital stay, and complications were documented and analyzed.

The mean graft take in this study was 94.3%, which is consistent with findings by Ramakrishnan⁽⁵⁾ et al. and Janzekovic⁽¹⁾ who demonstrated graft survival rates above 90% with early tangential excision. The early removal of necrotic tissue reduces bacterial colonization and prepares the wound bed optimally for graft acceptance.

Hospital stay in our patients averaged 12.8 days, which is notably shorter than the 18–21 days reported in studies involving conventional burn wound management. This reduction in hospital duration is a significant advantage in a tertiary care public hospital setting, where resources and beds are often limited.

Minor complications were observed in 5 of the 20 patients (25%), including two cases of seroma, two cases of minor graft loss, and one case of superficial infection. These complications were managed conservatively and did not impact overall graft success. This complication rate is in line with previous Indian studies (Subrahmanyam⁽⁴⁾ et al., Sujatha et al.) that reported minor adverse events in 20–30% of early excision cases.

A Pearson correlation analysis was performed between TBSA burn percentage and graft take percentage. Although a mild negative correlation ($r = -0.03$) was observed, the p-value of 0.916 indicated that this was not statistically significant. This suggests that the extent of burn injury within the <30% range did not have a major impact on graft uptake if early tangential excision was employed.

Our findings further reinforce the benefits of early tangential excision, particularly in settings where delayed healing and infection pose serious clinical and economic burdens. Tangential excision allows for timely closure of the wound, reduced systemic inflammatory response, and less scarring, thereby accelerating the recovery process.

Limitations of the study include a relatively small sample size, the absence of a randomized control group, and the restriction to a single center. Despite these, the consistency of results with global data strengthens the case for adopting early tangential excision as standard protocol in select burn patients.

CONCLUSION

This prospective study on early tangential excision in mixed flame burns involving less than 30% TBSA demonstrates that early surgical intervention provides clear clinical advantages in terms of wound healing, graft take, and hospital stay. The procedure is both safe and effective when performed within the optimal post-burn window (day 4 to 5) in hemodynamically stable patients.

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