



“SPECTRUM OF TRAUMA-RELATED PLASTIC SURGERY CASES PRESENTING TO THE EMERGENCY DEPARTMENT OF A TERTIARY CARE CENTRE”

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Abstract

Background: Trauma represents a leading cause of morbidity and mortality, with a growing subset of patients requiring specialized plastic surgical intervention for complex soft tissue, skeletal, and neurovascular injuries. Early involvement of plastic surgeons in the emergency department is critical for restoring function, preventing complications, and optimizing aesthetic outcomes. This study aims to characterize the spectrum, management, and short-term outcomes of trauma-related plastic surgery cases in a tertiary care Indian centre.

Methods: This prospective observational study was conducted at the Department of Plastic Surgery, Government Kilpauk Medical College, Chennai, India, over 12 months. Forty consecutive patients presenting with acute trauma requiring plastic surgery intervention were enrolled. Data collected included demographics, mechanism and anatomical site of injury, type and complexity of trauma, surgical interventions, time to surgery, and short-term clinical outcomes. Descriptive statistics were used to analyze categorical variables.

Results: Of 40 patients, 77.5% were male and 55% aged 18–45 years. Road traffic accidents were the most common mechanism (60%). Hand and wrist injuries predominated (45%), followed by facial trauma (37.5%). Surgical management included complex primary closures (35%), tendon/nerve repairs (25%), facial fracture fixation (15%), skin grafting (12.5%), local/regional flaps (7.5%), and microvascular revascularization (5%). Most patients (87.5%) underwent surgery within 24 hours. Short-term outcomes were favorable, with 85% achieving primary wound healing, 10% experiencing surgical site infection, and 7.5% requiring secondary revision.

Conclusion: Trauma-related plastic surgery in the emergency setting predominantly involves young adult males with hand and facial injuries, frequently resulting from road traffic accidents. Early, specialized intervention following the reconstructive ladder ensures high rates of primary wound healing, minimizes complications, and supports functional and aesthetic recovery. These findings highlight the essential role of plastic surgery in multidisciplinary trauma care and underscore the need for timely referral and resource planning in tertiary centres.

Keywords: Plastic surgery, Trauma, Hand injuries, Facial injuries, Emergency reconstruction

Introduction

Trauma remains a leading cause of morbidity and mortality worldwide, with an increasing proportion of patients requiring specialized reconstructive input for complex soft tissue, skeletal, and neurovascular injuries. Within this paradigm, plastic surgery has emerged as a key component of multidisciplinary trauma care, particularly in tertiary centres where high volumes of facial, hand, and limb injuries converge through the emergency department. The burden of trauma-related plastic surgery extends beyond immediate life-saving interventions to encompass restoration of form, function, and aesthetics, thereby directly influencing long-term quality of life, return to work, and psychosocial rehabilitation. As regional trauma systems and referral pathways evolve, understanding the spectrum of injuries that demand plastic surgical expertise is essential for service planning, workforce allocation, training, and resource optimization.[1,2]

Epidemiological data from trauma centres indicate that facial and hand injuries constitute the majority of referrals to plastic surgery, often occurring in the context of polytrauma. In a Korean regional trauma centre, Kim et al. reported that approximately 15% of all trauma patients required plastic surgical management, with facial trauma diagnosed in over 90% of severely injured cases and traffic accidents accounting for more than 60% of mechanisms. Similarly, Czerny et al. demonstrated that facial trauma (41%) and hand trauma (36%) were the most common indications for plastic surgery in a high-level European trauma unit, frequently necessitating collaborative procedures with neurosurgery, orthopaedics, and general surgery. These injuries range from simple lacerations and soft tissue avulsions to complex fractures, tendon and nerve lacerations, and composite tissue loss, demanding precise reconstruction to prevent functional deficits and disfigurement.[3,4]

The emergency department is often the first point of contact where decisions regarding timing, prioritization, and extent of plastic surgical intervention are made. Studies of emergency plastic surgery consultations have shown that trauma is the dominant indication, comprising up to 70–80% of cases, with soft tissue injuries, fractures, and tendon or nerve damage being the most frequent patterns. Immediate specialist involvement has been associated with improved functional and aesthetic outcomes, reduced complication rates, and decreased need for secondary revisions. Furthermore, changes in trauma networks and centralization of services have led to a substantial rise in plastic surgery operative workload; in one UK major trauma centre, emergency plastic cases increased more than sevenfold over a three-year period following network reconfiguration.[5]

Despite this growing role, there is limited region-specific data from Indian tertiary care centres describing the full spectrum of trauma-related plastic surgery presentations to the emergency department. Most available literature focuses either on isolated facial or hand trauma or on overall trauma epidemiology without disaggregating the plastic surgery subset. There remains a need to delineate demographic patterns, mechanisms of injury, anatomical distribution, and operative interventions in order to identify gaps in pre-hospital care, referral practices, and in-hospital pathways. The present study, conducted in the emergency department of a tertiary care centre, aims to characterize the spectrum of trauma-related plastic surgery cases, including facial, hand, extremity, and soft tissue injuries, and to describe their management patterns and immediate outcomes. By mapping this case-mix, the study seeks to provide evidence to guide manpower planning, training priorities, and development of protocols tailored to the local trauma burden.[6,7]

Method and material

This prospective observational study was conducted in the **Department of Plastic Surgery at Government Kilpauk Medical College, Chennai, Tamil Nadu, India**, over a period of twelve months. Following approval from the Institutional Ethics Committee and obtaining written informed consent, 40 consecutive patients presenting to the Emergency Department with trauma-related injuries requiring plastic surgery intervention were enrolled. The study included patients of all ages

and genders with acute soft tissue injuries, facial fractures, or extremity trauma, while excluding those with life-threatening instability requiring prior life-saving general surgical or neurosurgical intervention.

Upon presentation, patients underwent a systematic assessment to record demographics, the mechanism of injury, and the specific anatomical site involved. Injuries were classified based on the complexity of tissue involvement, including simple lacerations, degloving injuries, tendon or nerve disruptions, and maxillofacial fractures. The surgical management strategy was determined according to the "reconstructive ladder," ranging from thorough debridement and complex primary closure to specialized procedures such as Open Reduction and Internal Fixation (ORIF) for facial bones, tendon/nerve tenorrhaphy, and microvascular procedures.

The interval between injury and surgical intervention was documented, with a focus on patients treated within the "golden hour" or the first 24-hour window. Postoperative monitoring focused on short-term clinical outcomes, specifically assessing for primary wound healing and early complications such as surgical site infection (SSI), graft loss, or flap necrosis. Data were analyzed using descriptive statistics, with categorical variables expressed as frequencies and percentages.

Results

The study analyzed 40 emergency trauma cases, revealing a predominant demographic of males (77.5%) and individuals aged 18–45 years (55.0%), with Road Traffic Accidents (60.0%) serving as the leading mechanism of injury (Table 1). Anatomical assessment showed that hand and wrist injuries were the most frequent (45.0%), followed by facial trauma (37.5%), involving a mix of soft tissue lacerations, fractures, and neurovascular deficits (Table 2). The spectrum of surgical management was broad, ranging from complex primary closures (35.0%) to specialized procedures such as tendon repairs and microvascular revascularization (Table 3). While the majority of cases presented as isolated plastic surgery trauma (65.0%), a significant portion involved polytrauma requiring multidisciplinary coordination, with most patients (87.5%) receiving surgical intervention within 24 hours of arrival (Table 4). Short-term clinical outcomes were favorable, with 85.0% of patients achieving primary wound healing, despite a 10.0% incidence of superficial surgical site infections (Table 5).

Table 1: Patient Demographics and Injury Mechanism (n = 40)

Variable	Categories	Frequency (n)	Percentage (%)
Age Group	< 18 years	8	20.0%
	18–45 years	22	55.0%
	> 45 years	10	25.0%
Gender	Male	31	77.5%
	Female	9	22.5%
Mechanism	Road Traffic Accident (RTA)	24	60.0%
	Assault/Personal Violence	6	15.0%
	Industrial/Workplace Injury	5	12.5%
	Domestic Accidents (Falls/Cuts)	5	12.5%

Table 2: Anatomical Distribution and Type of Injury (n = 40)

Anatomical Region	Injury Type	Frequency (n)	Percentage (%)
Facial Region	Soft tissue lacerations / Fractures	15	37.5%
Hand and Wrist	Tendon/Nerve injuries / Fractures	18	45.0%
Lower Limb	Degloving injuries / Open fractures	5	12.5%
Trunk/Other	Extensive abrasions / Avulsions	2	5.0%

Table 3: Emergency Surgical Interventions Performed (n = 40)

Procedure Performed	Frequency (n)	Percentage (%)
Complex Primary Closure	14	35.0%
Tendon/Nerve Repair	10	25.0%
Facial Fracture Fixation (ORIF)	6	15.0%
Skin Grafting (STSG/FTSG)	5	12.5%
Local/Regional Flaps	3	7.5%
Revascularization/Microsurgery	2	5.0%

Table 4: Severity and Associated Injuries (n = 40)

Variable	Categories	Frequency (n)	Percentage (%)
Injury Severity	Isolated Plastic Surgery Trauma	26	65.0%
	Polytrauma (Multi-specialty)	14	35.0%
Time to Surgery	< 6 Hours (Golden Hour)	12	30.0%
	6 – 24 Hours	23	57.5%
	> 24 Hours	5	12.5%

Table 5: Short-Term Clinical Outcomes (n = 40)

Outcome Metric	Frequency (n)	Percentage (%)
Primary Wound Healing	34	85.0%
Surgical Site Infection (SSI)	4	10.0%
Partial Necrosis/Graft Loss	2	5.0%
Secondary Revision Required	3	7.5%

Discussion

The discussion of these results highlights the critical role of plastic surgery in the multidisciplinary management of acute trauma, particularly for the economically active male population (77.5%) aged 18–45 years, aligning with Jeswani et al.'s findings from a single-centre study where young males constituted 75-80% of plastic surgical trauma cases[8]. The high incidence of Road Traffic Accidents (60%) as the primary mechanism of injury underscores the emergency department's need for immediate access to plastic surgical expertise to manage complex soft tissue injuries and bony trauma; this mirrors Kim et al.'s epidemiology where traffic accidents drove 62.3% of severe trauma requiring plastic input in a regional centre [1]. A significant finding is the predominance of hand and wrist injuries (45%), which are often high-stakes due to the intricate anatomy of tendons and nerves; the fact that 25% of all cases required specialized tendon or nerve repair emphasizes that functional preservation is as vital as wound coverage in the emergency setting, consistent with Nicolai et al.'s report of 35-40% hand trauma referrals with 20-30% needing primary tendon repair [7].

Furthermore, the anatomical distribution involving the facial region (37.5%) illustrates the spectrum of care ranging from aesthetic suturing to rigid internal fixation of fractures, corroborating Czerny et al.'s trauma centre data showing facial injuries in 41% of plastic consultations [2]. The broad range of interventions performed—from complex primary closures (35%) to microsurgical revascularization (5%)—demonstrates that a tertiary care center must be equipped to handle both basic and highly specialized reconstructive tasks; Giannas et al. documented a similar spectrum with primary closures in 40% and microvascular procedures in 4-6% post-trauma network implementation [6]. The timing of intervention is another crucial factor, with 87.5% of patients undergoing surgery within the first 24 hours; this prompt surgical response likely contributed to the high rate of primary wound healing (85%) and the relatively low incidence of major complications, as supported by Gruss et al. who advocated early reconstruction yielding 80-90% primary healing in facial soft tissue trauma [3].

The presence of polytrauma in 35% of the cases suggests that the plastic surgeon often functions as part of a larger trauma team, coordinating with orthopedic and neurosurgical departments; Czerny et al. noted 37% interdisciplinary collaborations, predominantly with orthopaedics for extremity injuries [2]. While a 10% infection rate was noted, it is consistent with the contaminated nature of RTA-related injuries and emphasizes the importance of thorough debridement and antibiotic prophylaxis, falling within the 8-13% range reported by Fischer et al. in ortho-plastic open fracture series[9]. Ultimately, these findings suggest that early involvement of plastic surgery in the emergency spectrum not only ensures better wound care but also significantly optimizes the long-term functional and aesthetic recovery of trauma victims, as evidenced by Dönmez et al.'s emergency consultation audit showing reduced revisions with specialist input[10].

Conclusion

Trauma-related plastic surgery plays a pivotal role in the multidisciplinary management of acute injuries, particularly for young adult males affected by road traffic accidents. Hand, wrist, and facial injuries dominate the case spectrum, often requiring complex interventions such as tendon/nerve repair, fracture fixation, and microvascular procedures. Early involvement of plastic surgeons, guided by the reconstructive ladder, ensures high rates of primary wound healing, minimizes complications, and preserves both function and aesthetics. These findings underscore the importance of prompt referral, resource allocation, and specialized training in tertiary care centres to optimize outcomes and reduce the long-term burden of trauma-related morbidity.

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