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"PATTERNS AND OUTCOMES OF RECONSTRUCTIVE PLASTIC SURGERY IN A TEACHING HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY"

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Abstract

Background: Reconstructive plastic surgery is integral to modern healthcare, particularly in teaching hospitals where complex trauma, oncologic defects, burns, congenital anomalies, and chronic wounds converge. These procedures restore function and aesthetics, improve quality of life, and reduce morbidity, while teaching institutions simultaneously provide training and innovate in surgical techniques. Understanding the patterns, outcomes, and complications of reconstructive cases in such settings is crucial for service planning and resource allocation.

Methods: A prospective observational study was conducted at the Department of Plastic Surgery, Government Kilpauk Medical College, Chennai, India, from January 2021 to December 2023. Thirty-five consecutive patients undergoing reconstructive procedures across trauma, oncology, burns, congenital anomalies, and chronic wounds were enrolled. Data collected included demographics, etiology, anatomical site, surgical procedure, intraoperative and postoperative complications, and functional and aesthetic outcomes. Follow-up assessments were performed at 1 week, 1 month, 3 months, and 6 months, with complications graded per Clavien-Dindo and functional/aesthetic outcomes measured via validated tools.

Results: The cohort included predominantly adults (62.9%), with a slight male predominance (54.3%). Post-traumatic (42.9%) and post-oncological (28.6%) cases were most common. Head and neck (34.3%) and upper limb/hand (28.6%) reconstructions predominated. Skin grafting (40%) was the most frequent procedure, complemented by local/regional flaps (45.7%) and free microvascular flaps (5.7%). Uneventful healing occurred in 77.1%, with minor complications in 17.1% and major complications in 5.7%. At six months, functional restoration was achieved in 80% and overall patient satisfaction was 85.7%.

Conclusion: Reconstructive plastic surgery in a teaching hospital setting effectively addresses complex functional and aesthetic needs, with high rates of healing, functional restoration, and patient satisfaction. The findings highlight the critical role of teaching institutions in managing diverse reconstructive challenges, training future surgeons, and providing patient-centered care.

Keywords: Reconstructive surgery, Teaching hospital, Trauma, Flap reconstruction, Patient outcomes

Introduction

Reconstructive plastic surgery constitutes a cornerstone of modern healthcare delivery in teaching hospitals, where diverse pathologies converge to demand sophisticated interventions for functional and aesthetic restoration. These procedures address congenital anomalies, trauma sequelae, oncologic defects, burns, and chronic wounds, significantly impacting patient quality of life, morbidity reduction, and socioeconomic productivity. Teaching institutions, with their academic mandate, serve as referral hubs for complex cases, fostering innovation, training, and outcome optimization amid evolving surgical techniques and resource constraints.[1]

Globally, reconstructive surgery volumes have surged, with U.S. data revealing over 5 million procedures annually by 2018, predominantly for breast reconstruction (post-mastectomy), skin cancer excision, pressure ulcer repair, and flap coverage. In resource-limited settings, patterns skew toward trauma (30-50%), burns (20-30%), and congenital defects (10-20%), reflecting injury epidemiology and delayed presentations. Jeswani et al. documented trauma as 82% of caseload in a Pakistani teaching hospital, underscoring regional disparities versus aesthetic dominance in high-income contexts.[2]

Prospective observational studies illuminate these patterns, revealing hand surgery (20-40%), head/neck reconstruction (15-25%), and lower extremity coverage (10-20%) as predominant, with skin grafts (25-35%), local flaps (20-30%), and pedicled flaps (10-15%) as workhorses. Outcomes metrics—complication rates (5-15%), readmissions (<10%), and satisfaction (>80%)—hinge on multidisciplinary care, early excision, and adjuncts like negative-pressure therapy. Teaching hospitals report comparable efficacy to specialized units but higher training-related minor complications (2-5%).[3]

Challenges persist: microvascular free flaps (5-10% caseload) demand expertise scarce in low-volume centres, while breast reconstruction lags (5-10%) due to oncoplastic silos. Prospective designs capture real-time data on demographics (young males for trauma, females for breast), mechanisms (RTAs 30-60%), and trends like rising post-bariatric body contouring. In India/Pakistan, public sector teaching hospitals bear 70-80% burden, with audits revealing infection rates 8-12% and graft take >90%.[4]

This prospective observational study at a teaching hospital delineates reconstructive patterns across modules (trauma, oncology, burns, congenital), demographics, procedures, and outcomes. By quantifying casemix, success rates, and complications, it addresses evidence gaps for service planning, resident training, and policy in resource-constrained academia.

Materials and Methods

This prospective observational study was conducted at the Department of Plastic Surgery, Government Kilpauk Medical College, Chennai, Tamil Nadu, India, from January 2021 to December 2023. All consecutive patients undergoing reconstructive plastic surgery procedures were enrolled after obtaining written informed consent. Inclusion criteria comprised individuals aged ≥1 year scheduled for reconstructive surgery across modules including post-traumatic, post-oncological, burns, congenital anomalies, and chronic wounds. Exclusion criteria included elective aesthetic procedures, emergency trauma cases (<24 hours post-injury), and patients declining follow-up.

Data were prospectively collected using a standardized proforma capturing demographics (age, gender, occupation), etiology (trauma, oncology, burns, congenital, others), anatomical site (head/neck, upper/lower extremity, trunk, breast), comorbidities (diabetes, smoking, BMI), preoperative assessment (photography, Doppler for flaps), surgical details (procedure type [skin graft, local/regional/pedicled/free flap, tissue expansion], operative duration, intraoperative

complications, blood loss), anesthesia type, and surgeon seniority (consultant/resident under supervision).

Postoperative outcomes were monitored at 1 week (wound healing, graft/flap viability), 1 month (minor complications [infection, dehiscence, seroma managed conservatively]), 3 months (major complications [flap failure, reoperation]), and 6 months (functional restoration [range of motion, DASH/BREAST-Q scores where applicable], aesthetic satisfaction [5-point Likert scale: 1=poor, 5=excellent], recurrence). Complications were graded per Clavien-Dindo classification. Patient satisfaction encompassed overall outcome, scar appearance, and functional gain via validated telephonic questionnaires by blinded assessors.

Surgical techniques adhered to reconstructive ladder principles: primary closure/secondary intention for small defects; skin grafts (split/full-thickness from thigh/abdomen); local advancement/rotation flaps; regional pedicled flaps (LD, TDAP); free flaps (ALT, radial forearm) with supermicrosurgery under operating microscope; adjuncts like NPWT and tissue expanders as indicated. Postoperative protocols included antibiotics (culture-guided), dressings, splinting, and multidisciplinary rehabilitation.

Data analysis utilized descriptive statistics: continuous variables as mean ± SD or median (IQR), categorical as frequencies/percentages. Intergroup comparisons employed chi-square/Fisher's exact or t-test/Mann-Whitney U tests. Multivariate logistic regression assessed predictors of complications/outcomes (OR, 95% CI). Significance was $p<0.05$. The study followed STROBE guidelines. Institutional Ethics Committee approval was obtained (IRB No. IEC/NKM/2021/05), ensuring confidentiality and Helsinki Declaration compliance.

Result

The prospective evaluation of 35 patients revealed that reconstructive plastic surgery at this teaching hospital is predominantly driven by post-traumatic (42.9%) and post-oncological (28.6%) etiologies, with adults aged 18–60 years constituting the largest patient group (Table 1). Anatomical distribution was led by head and neck procedures (34.3%), followed closely by upper limb and hand reconstructions (Table 2). Surgical patterns reflected a diverse repertoire, where skin grafting remained the most common modality (40.0%), supplemented by a significant number of local and regional flaps (45.7%) and specialized microvascular procedures (Table 3). Short-term postoperative monitoring indicated that 77.1% of patients experienced uneventful healing, though a minor complication rate of 17.1% was noted, primarily consisting of seromas and partial graft loss (Table 4). Long-term assessment at six months demonstrated high efficacy, with 80% of the cohort achieving good-to-excellent functional restoration and an overall patient satisfaction rate of 85.7% (Table 5).

Table 1: Baseline Demographics and Clinical Presentation (n = 35)

This table categorizes the patient population and the primary etiology for surgery.

Variable	Categories	Frequency (n)	Percentage (%)
Age Group (Years)	Pediatric (< 18)	7	20.0%
	Adult (18–60)	22	62.9%
	Geriatric (> 60)	6	17.1%
Gender	Male	19	54.3%
	Female	16	45.7%
Primary Etiology	Post-Traumatic	15	42.9%
	Post-Oncological	10	28.6%
	Congenital Anomalies	6	17.1%
	Chronic Wounds/Others	4	11.4%

Table 2: Anatomical Distribution of Reconstructive Sites (n = 35)

Anatomical Region	Frequency (n)	Percentage (%)	Common Condition
Head and Neck	12	34.3%	Post-cancer excision/Cleft lip
Upper Limb/Hand	10	28.6%	Tendon injury/Syndactyly
Lower Limb	8	22.9%	Post-traumatic skin loss
Trunk/Breast	5	14.2%	Post-mastectomy/Pressure sore

Table 3: Reconstructive Procedures Performed (n = 35)

Procedure Type	Frequency (n)	Percentage (%)
Skin Grafting (STSG/FTSG)	14	40.0%
Local Flaps	9	25.7%
Regional/Pedicled Flaps	7	20.0%
Congenital Repair (e.g., Cleft)	3	8.6%
Free Microvascular Flaps	2	5.7%

Table 4: Postoperative Clinical Outcomes (n = 35)

Outcome Metric	Frequency (n)	Percentage (%)
Uneventful Healing	27	77.1%
Minor Complications	6	17.1%
- Seroma/Hematoma	3	8.6%
- Partial Graft/Flap Loss	2	5.7%
- Superficial Infection	1	2.8%
Major Complications	2	5.7%
- Total Flap Failure	1	2.8%
- Wound Dehiscence (Deep)	1	2.8%

Table 5: Functional and Aesthetic Success (n = 35)

Parameter	Excellent/Good	Satisfactory	Poor
Functional Restoration	28 (80%)	5 (14.3%)	2 (5.7%)
Aesthetic Outcome	24 (68.6%)	9 (25.7%)	2 (5.7%)
Patient Satisfaction	30 (85.7%)	4 (11.4%)	1 (2.9%)

Discussion

The surgical patterns observed confirm the continued utility of the "reconstructive ladder," where skin grafting (40%) serves as a versatile workhorse, yet the significant proportion of flap-based reconstructions (45.7% combined) indicates a transition toward more robust and reliable tissue coverage. The successful utilization of free microvascular flaps (5.7%), though smaller in volume, demonstrates the advanced capabilities of the department in managing defects that cannot be closed by traditional means. Furthermore, the 77.1% rate of uneventful healing is comparable to international standards for general reconstructive services, with the 17.1% minor complication rate being an expected outcome in a setting that handles complex, often contaminated, traumatic wounds.Perhaps the most significant finding is the 80% functional restoration rate and 85.7% patient satisfaction score at the six-month follow-up. These metrics suggest that the surgical interventions provided at Government Kilpauk Medical College effectively meet the primary goal of reconstructive surgery—returning the patient to their baseline activities of daily living with a preserved sense of self-image. The correlation between successful functional outcomes and high patient satisfaction highlights the importance of a patient-centered approach, where the choice of reconstructive technique is tailored to the individual's functional needs and lifestyle.The discussion of these findings highlights the broad spectrum of reconstructive challenges managed at a teaching hospital, where the demographic profile—dominated by the productive age group of 18–60 years—

reflects the high incidence of occupational and road traffic trauma, consistent with Jeswani et al.'s [2]single-centre experience reporting 75% patients aged 20-50 years in a similar public teaching setting . The fact that post-traumatic and post-oncological etiologies collectively account for over 70% of the cases underscores the dual responsibility of the plastic surgery unit: providing urgent functional restoration while maintaining oncological safety and aesthetic form; this distribution aligns with Osei-Tutu et al.'s [5]analysis in a resource-limited teaching hospital, where trauma (29.6%) and oncologic reconstruction dominated 50.1% of procedures . The high frequency of head and neck reconstructions (34.3%) particularly emphasizes the role of the teaching hospital in managing complex cases, such as cleft lip repairs and post-cancer reconstructions, which require a high level of technical expertise and specialized postoperative care; Kim et al.[6] corroborated 30-35% head/neck caseload in trauma-reconstructive cohorts from academic centre's .

The surgical patterns observed confirm the continued utility of the "reconstructive ladder," where skin grafting (40%) serves as a versatile workhorse, yet the significant proportion of flap-based reconstructions (45.7% combined) indicates a transition toward more robust and reliable tissue coverage; this mirrors Orgill et al.'s[7] review advocating grafts in 35-45% and flaps in 40-50% of hospital-based reconstructions . The successful utilization of free microvascular flaps (5.7%), though smaller in volume, demonstrates the advanced capabilities of the department in managing defects that cannot be closed by traditional means; Fischer et al.[8] reported 4-7% free flap utilization with 92-95% success in teaching hospital extremity series. Furthermore, the 77.1% rate of uneventful healing is comparable to international standards for general reconstructive services, with the 17.1% minor complication rate being an expected outcome in a setting that handles complex, often contaminated, traumatic wounds, as per Pusic et al.'s [9]multicenter data showing 15-20% minor morbidity .

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Conclusion

Reconstructive plastic surgery in a teaching hospital setting effectively addresses a broad spectrum of complex cases, predominantly post-traumatic and post-oncological, across head and neck, upper limb, and lower limb regions. The application of the reconstructive ladder, including skin grafts, local/regional flaps, and microvascular free flaps, enables restoration of both function and aesthetics with high rates of wound healing and patient satisfaction. Teaching hospitals not only provide advanced care for diverse pathologies but also serve as essential training and referral hubs, promoting surgical expertise and evidence-based protocols. These findings underscore the importance of continued investment in resources, multidisciplinary collaboration, and patient-centered approaches to optimize long-term functional outcomes and quality of life in reconstructive patients.

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