

Trends, Indications, and Postoperative Outcomes of Microsurgical Reconstruction in BIRDEM General Hospital

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ABSTRACT

Background & objective: Microsurgery plays a pivotal role in reconstructive surgery, particularly in managing complex posttraumatic, post-infection, and post-oncologic defects, yet there is limited local data on the demographic, clinical characteristics, and outcomes of patients undergoing microsurgical procedures in Bangladesh. This study aims to evaluate the demographic patterns, clinical indications, and postoperative outcomes of microsurgical procedures at a leading tertiary care center.

Methods: A mixed-methodological study combining a prospective observational design with retrospective data evaluation was conducted at BIRDEM General Hospital, Dhaka, from March 2022 to March 2024. A total of 45 patients aged 18 and above who underwent microsurgical reconstruction (free flaps or nerve repairs) were included via purposive sampling. Data on demographics, surgical indications, flap types, and postoperative complications were analyzed using SPSS, v25.0.

Results: The majority of patients were male (75.6%), with over 70% falling within the economically productive age group of 31–60 years. Trauma-related defects (15.6%), squamous cell carcinoma of the buccal mucosa (13.3%), and odontogenic cysts (11.1%) were the primary indications for surgery. The anterolateral thigh (ALT) flap was the most frequently used reconstructive tool (46.7%), followed by the radial forearm (24.4%) and latissimus dorsi (15.6%) flaps. The overall success rate was high, with 89% of patients experiencing uneventful recoveries. The total flap failure rate was only 2.2%. The mean postoperative hospital stay was 4.6 ± 2.1 days with the shortest and the longest stays being 2 and 12 days respectively.

Conclusion: Microsurgical reconstruction at BIRDEM General Hospital is a highly effective intervention with success rates comparable to international benchmarks. The ALT flap remains the "workhorse" of reconstruction due to its versatility. While clinical outcomes are favorable, there is a need for enhanced institutional infrastructure and standardized training to sustain and expand these life-altering services in Bangladesh.

Keywords: Microsurgery, ALT Flap, Free Tissue Transfer, Reconstruction, BIRDEM.

INTRODUCTION:

Microsurgery has revolutionized the landscape of reconstructive surgery, offering unparalleled precision in restoring forms and functions of affected organs following trauma, oncologic resection, or congenital deformities. In developing nations like Bangladesh, the demand for microsurgical intervention is acutely driven by high rates of

industrial accidents and road traffic injuries, often exacerbated by evolving occupational hazards. For these patients, microsurgical reconstruction is not merely a clinical choice but a socioeconomic necessity for restoring quality of life and economic productivity.

Microsurgical techniques, particularly free tissue transfer, have become the gold standard for

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addressing complex reconstructive challenges involving extensive soft tissue loss, exposed vital structures (bones, tendons, or neurovascular bundles), and large-scale oncological defects in the head, neck, and extremities. Among these, the anterolateral thigh (ALT) flap has emerged as a cornerstone of modern practice due to its versatility, reliable vascular anatomy, and the ability to facilitate a two-team approach.^{1,2}

Existing literature suggests that the need for microsurgery is highest among the economically active population, specifically those aged 31 to 60 years, who are frequently victims of trauma or tobacco-related oral malignancies.^{3,4} This demographic trend necessitates not only surgical precision but also structured postoperative care and prolonged rehabilitation to ensure successful reintegration into the workforce.⁵ Furthermore, gender disparities are frequently observed, with a higher prevalence among males due to increased exposure to high-risk occupational environments.⁶

Despite the global maturation of microsurgical techniques, regional data from South Asia, and Bangladesh in particular, remain sparse. This lack of localized data hinders the development of evidence-based healthcare planning and specialized rehabilitation strategies. There is a paramount need to evaluate the demographic trends, surgical indications, and postoperative outcomes specifically to the Bangladeshi context. This study aims to analyze the clinical profile and microsurgical outcomes at BIRDEM General Hospital, providing data-driven insights to guide workforce training, resource allocation, and clinical protocols in a tertiary care setting.

METHODS:

This study employed a mixed-methodological approach, combining a prospective observational design with retrospective data evaluation. The research was conducted at the Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) General Hospital, Dhaka. The study period spanned two years, from March 2022 to March 2024. A total of 45 patients were selected using a purposive sampling technique. Patients of either gender, aged

18 years and above, who underwent microsurgical procedures (free flaps or nerve repairs) during the study period. However, pediatric patients (below 18 years) and patients with incomplete medical records were excluded. Ethical clearance was obtained from the institutional review board. Informed consent was waived for the retrospective nature of data, while maintaining strict patient confidentiality.

Data were meticulously extracted from hospital electronic records, operation theater logs, and individual case files. Key variables of interest included:

- **Demographics:** Age and sex.
- **Clinical Presentation:** Primary diagnosis and indications for surgery.
- **Operative Details:** Type of surgical flaps utilized (e.g., ALT, Radial Forearm, Fibula).
- **Postoperative Outcomes:** Duration of hospital stay, flap survival rates, and complications (e.g., infection, wound dehiscence, partial or total flap failure).

Statistical analysis was performed using IBM SPSS Statistics, version 25.0. Descriptive statistics were used to summarize the data; categorical variables are presented as frequencies with corresponding percentages, while continuous variables (such as age and hospital stay) were expressed as mean $\pm$ standard deviation (SD).

RESULTS:

Demographic Profile

The study population predominantly consisted of patients in their most economically productive years. The largest cohort (40%) was aged 31-45 years, followed by those aged 46-60 years (31.1%). Patients over the age of 60 represented the least fraction (15.6%), a trend potentially attributable to a higher prevalence of systemic comorbidities or more conservative surgical referrals in the elderly [Table I]. A marked gender disparity was observed, with 34 patients (75.6%) being male, yielding a male-to-female ratio of approximately 3:1 [Figure 1].

Clinical Indications

The indications for microsurgical reconstruction were diverse, spanning trauma, oncology, and pathology.

Trauma-related defects involving exposed tendons or neurovascular bundles were the most frequent indication (15.6%). Oncological and pathological resections followed closely, with squamous cell carcinoma (SCC) of the buccal mucosa accounting for 13.3% and odontogenic cysts of the mandible representing 11.1% of cases. Soft tissue defects of the dorsal hand and forearm constituted 8.9%. The remaining 51.1% comprised a broad spectrum of less frequent clinical conditions, highlighting the versatile application of microsurgery in this tertiary facility [Table II].

Surgical Procedures

Analysis of the surgical techniques revealed that the anterolateral thigh (ALT) flap was the primary choice for reconstruction, utilized in 46.7% (n = 21) of all cases. Other significant donor sites included the radial forearm free flap (24.4%), the latissimus dorsi muscle flap (15.6%), and the free fibular flap for bony reconstructions [Table III].

Postoperative Outcomes and Hospitalization

The overall success rate of the microsurgical interventions was high, with 88.9% (n = 36) of patients experiencing an uneventful recovery. Complications were relatively infrequent: infection and wound dehiscence were each observed in 4.4% of cases, while total flap loss occurred in only one instance (2.2%). Miscellaneous minor complications accounted for the 9% cases. Multiple complications occur in 4 out of 5 cases (80%). These findings underscore the safety and efficacy of microsurgical reconstruction within this clinical setting when supported by rigorous surgical technique and attentive postoperative monitoring. The average duration of postoperative hospitalization was 4.6 ± 2.1 days with the shortest and the longest stays being 2 and 12 days respectively [Table IV].

Table I: Age distribution of the study population. (n=45)

Age Group	Frequency	Percentage
≤ 30	6	13.3
31–45	18	40.0
46–60	14	31.1
>60	7	15.6

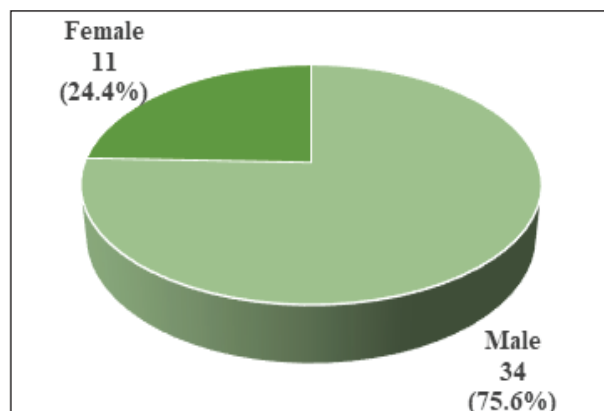


Figure 1: Gender Distribution

Table II: Diagnosis and frequency of the disease. (n=45)

Diagnosis	Frequency	Percentage
Exposed tendo-achillis	7	15.6
SCC buccal mucosa	6	13.3
Odontogenic cyst, mandible	5	11.1
Wound dorsum of hand and forearm	4	8.9
Others (various other diagnoses)	23	51.1

Table III: Types of Surgery of the study population. (n=45)

Surgery Name	Frequency	Percentage
Anterolateral thigh (ALT) flap	21	46.7
Latissimus dorsi muscle flap	7	15.6
Radial forearm free flap	11	24.4
Free fibular flap	6	13.3

Table IV: Distribution of patients by their outcomes of reconstructive microsurgery (n = 45*)

Outcomes	Frequency	Percentage
Uneventful Recovery	40	88.9
Wound Dehiscence	2	4.4
Infection	2	4.4
Total Flap Loss	1	2.2
Other Complications	4	9.0

*Total will not correspond to 100% for multiple response

DISCUSSION

This study provides a comprehensive evaluation of microsurgical reconstruction at a leading tertiary care center in Bangladesh, delineating the interplay between patient demographics, surgical indications,

and clinical outcomes. Our findings reflect a growing proficiency in complex reconstruction within resource-constrained environments, while highlighting specific regional socio-epidemiological trends.

The results demonstrate a significant preponderance of male patients (75.6%) within the economically productive age group of 31–60 years. This demographic trend mirrors data from other developing economies, where males are disproportionately exposed to high-risk industrial environments and manual labor.^{7,8} The density of cases in this age group underscores the critical role of microsurgery not merely as a clinical intervention, but as a socio-economic necessity to restore functional capacity and prevent long-term disability in the productive workforce.

Trauma-related defects and oncologic resections (primarily squamous cell carcinoma and odontogenic cysts) were the leading indications for reconstruction. This is consistent with regional health burdens, where poor occupational safety and the high prevalence of smokeless tobacco use contribute to complex soft tissue and mandibular defects.^{9,10} The anterolateral thigh (ALT) flap emerged as the primary reconstructive tool (46.7%), reinforcing its status in international literature as the "workhorse" flap. Its dominance in this series is attributed to its versatile tissue components, minimal donor-site morbidity, and the ability to tailor the flap to various defect sizes.^{11,12} The successful utilization of a diverse array of flaps, including radial forearm and latissimus dorsi, indicates a high level of technical adaptability within the surgical team.

The high success rate, evidenced by nearly 90% uneventful recovery and a low total flap failure rate (2.2%), compares favorably with international benchmarks for free tissue transfer.¹³ These outcomes suggest that despite limited resources, standardized surgical techniques and vigilant perioperative monitoring can yield results equivalent to high-resource settings. Furthermore, the mean hospital stay of 4.6 days with the relatively narrow standard deviation 2.1 days suggests a standardized recovery protocol, with only a small subset of patients requiring extended stays due to complex wound management or surgical secondary intent.

This is essential for reducing the economic burden on both the patient and the healthcare system.¹⁴

While these results are encouraging, the study is limited by its single-center scope and a relatively small sample size ($n = 45$). These factors may limit the generalizability of the findings to entire study population. Future research should focus on multicenter, prospective trials to establish to contribute to national clinical guidelines for the management of patients needing reconstructive microsurgery. Additionally, there remains a critical need for institutionalizing specialized microsurgery training and enhancing access to advanced micro-instrumentation to ensure the sustainability of these outcomes.

Conclusion

Microsurgical reconstruction at BIRDEM General Hospital demonstrates high clinical efficacy, with successful outcomes achieved in the vast majority of cases. The study highlights a demographic focus on middle-aged males, driven largely by trauma and oncologic resections. The ALT flap remains the cornerstone of practice due to its versatility, vascularity and reliability. While local surgical expertise is maturing, further investment in microsurgical infrastructure, standardized training programs, and public health initiatives for trauma prevention is essential to broaden the reach of these life-altering procedures.

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