ORIGINAL ARTICLE

VERSATILITY OF TENSOR FASCIA LATA FLAP FOR RECONSTRUCTION OF GROIN DEFECTS

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Background: The evolution of reconstructive surgery techniques has significantly improved the management of soft tissue defects across various anatomical regions. In 1972, McGregor *et al*. devised a pivotal method for generating a flap to cover hand defects. The benefits of this technique, which include a larger skin surface without the need for microsurgery and yielding an easily concealed donor site scar, quickly became a cornerstone in the field, evidencing its widespread acceptance and application. Objective was to compare outcomes such as wound infection, skin flap necrosis and hospital stay between primary closure and tensor fascia lata flap for the reconstruction of groin defects among patients presenting at tertiary care hospital, Karachi, Pakistan. **Methods:** It was a prospective observational study carried out at the Department of plastic surgery, Dow University of Health Sciences, Civil hospital, Karachi, Pakistan from 23rd August 2023 to 25th January 2024**.** Patients who had groin defects after trauma or excision of lymph node of age 20–80 years of either gender were included and divided into two groups. Group A (n=30) had patients who had primary wound closure, while Group B (n=30) had patients who underwent a tensor fascia lata flap procedure for wounds coverage. Both groups were compared in terms of wound infection, skin flap necrosis, and hospital stay following surgery after 4 weeks. Data was analyzed using SPSS version 23. **Results:** The overall average age of participants in the study was 35.7±11.18 years. Of 73.3% participants were male and 26.7% were female. Group B (TFL flap reconstruction) demonstrated significantly lower rates of wound infection (p=0.001) and skin flap necrosis (p=0.001) compared to Group A (primary closure). Additionally, the average hospital stay was significantly shorter for Group B than Group A (p=0.001). **Conclusion:** TFL flap reconstruction for groin defects significantly reduces postoperative complications, including wound infection and skin flap necrosis, and shortens hospital stays compared to primary closure.

Keywords: Tensor Fascia Lata flap, groin defects; Reconstruction; Wound infection; Skin flap necrosis; Hospital stay

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INTRODUCTION

The evolution of reconstructive surgery techniques has significantly improved the management of soft tissue defects across various anatomical regions. In 1972, McGregor *et al*. devised a pivotal method for generating a flap to cover hand defects. The benefits of this technique, which include a larger skin surface without the need for microsurgery and yielding an easily concealed donor site scar, quickly became a cornerstone in the field, evidencing its widespread acceptance and application.[1,2]

Later, the tensor fascia lata (TFL) flap, introduced by Wangensteen *et al.* in 1934 for the reconstruction of the abdominal wall, represented another significant milestone.[3] This is a fasciocutaneous flap and has many uses as a pedicled flap in various regions consisting ischium, groin, trochanter, perineum, and lower abdomen.[4,5] This versatile flap can be employed in plastic surgery field for the management of facial reanimation, pressure sores and as a free flap in post resection of lymph node dissection or malignant lesions.[4,5] This broad utility spectrum not only highlights the TFL flap's adaptability but also highlights the importance of rigorous patient selection, comprehensive preoperative preparation, and appropriate dissection techniques to avoid any complications.[1] Evidence revealed that TFL flap after groin dissection can decrease post-operative morbidity.[6,7] Furthermore, the TFL flap has been associated with a shorter hospital stay time.[6,7] This is particularly significant in the context of optimizing healthcare resources and improving patient recovery trajectories. The ease of mobilization post-surgery, attributed to the strategic location and harvesting technique of the TFL flap, also contributes to its appeal as a preferred option for surgeons and patients alike.[6,7]

When focusing on the reconstruction of the groin defects, Turley *et al.* have identified various techniques, such as flaps and split thickness skin graft, for addressing these complex surgical challenges.[8]

Despite these advancements, the debate over the optimal approach for groin defect reconstruction persists, highlighted by a notable scarcity of data on the efficacy of TFL flaps in this application. Thus, the aim of current study is to compare outcomes such as wound infection, skin flap necrosis and hospital stay between primary closure and tensor fascia lata flap for the reconstruction of groin defects among patients presenting at tertiary care hospital, Karachi, Pakistan. By examining these parameters, this research endeavours to offer plastic surgeons valuable insights into the advantages of the TFL flap, including enhanced mobility, reduced surgery time, and shorter hospital stays, thereby potentially refining the approach to groin defect reconstruction.

MATERIAL AND METHODS

It was a prospective observational study carried out at the Department of plastic surgery, Dow University of Health Sciences, Civil hospital, Karachi, Pakistan from 23rd August 2023 to 25th January 2024**.** Sample size of 29≈30 in each group was estimated using WHO sample size calculator. Statistics considered for major necrosis as 25% in primary closure[9] and 0% in tensor fascia lata flap[9], power of test as 80% and 95% confidence level. Patients who had groin defects after trauma or excision of lymph node of age 20–80 years of either gender were included in the study. Patients having previous scar or wound on donor site needed for flap reconstruction were excluded from the study. Non-probability consecutive sampling was employed for sample selection.

This research began after receiving clearance from the institute's ethical review committee (ERC#IRB-3097/DUHS/Approval/2023/323). Written informed consent was taken from all the included patients. Data regarding age, gender, smoking status (smoking >6 cigarettes per day from last 6 months) and hypertension (known cases of hypertension with at least duration of 6 months), diabetes (known cases of diabetes with at least duration of 6 months) were also be taken from all patients. Patients were divided into two groups on the basis of patient need, with best treatment required.

Group A received primary wound closure, while Group B underwent a tensor fascia lata (fasciocutaneous) flap procedure for wound coverage. In patients who have undergone reconstruction using tensor fascia lata flap, the skin was incised during dissection to provide room for the tensor fascia lata flap. A closed suction drain was put beneath the flaps and removed when drainage drops to less than 30 ml in 24 hours. An expert plastic surgeon executed all tensor fascia lata flap procedures. The donor site location was closed primarily without tension or in some cases with split thickness skin grafting. Patients in both groups were given antibiotics for five days following the operation. Both groups were compared in terms of wound infection, skin flap necrosis, and hospital stay following surgery. For wound infection (culture positive results) and skin flap necrosis (Necrosis was categorized as minor if it was 5% of the total surface area and major it was 85% on clinical examination) patients were followed up for 4 weeks. Some of the cases are displayed below in the figure 1-3.

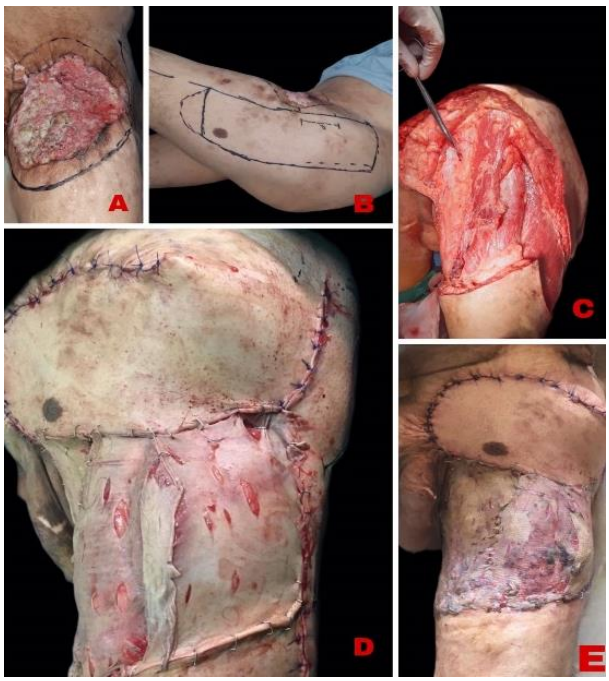

Figure-1: A 40 years male with squamous cell carcinoma of left inguinal (groin) region (A) showing excision with safe margins (B) marking of intraoperative Tensor fascia lata (TFL) flap (C) defect after excision and also showing flap being raised (D) Flap inset done and donor site of flap showing to be covered with split thickness skin graft (E) postoperative follow-up after 1 week

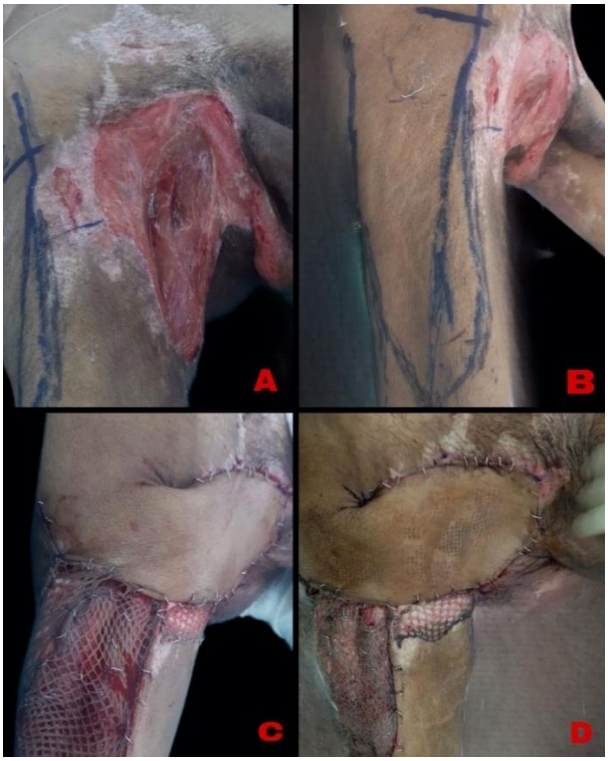

Figure-2: (A) A 33-year male with right Inguinal wound after debridement of groin infection (B) Intraoperative marking of Tensor fascia Lata (TFL) flap for wound coverage (C) Showing intraoperative Flap inset with donor site of flap covered with Split thickness skin graft (D) showing immediate postoperative.

Figure-3: (A) A 42 years male with open wound at left inguinal region after road traffic accident (B) showing wound closed by primary intention

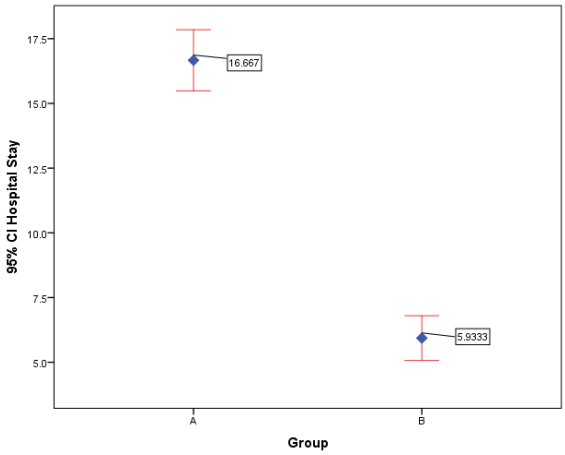

Figure-4: Mean hospital stays in both groups (n=60)

Statistical analysis was performed using SPSS version 23. Normality of numeric data was assessed using Shapiro-Wilk's test. Mean and SD were reported for numeric data like age and hospital stay. Frequency and percentage were reported for categorical data like gender, diabetes, hypertension and smoking. Comparison between both groups for wound infection and necrosis was done using Chi-square test/Fisher exact test, while hospital stay was compared using independent sample t test. Level of significance was set at 5%.

RESULTS

The overall average age of participants in the study was 35.7±11.18 years. Of 73.3% participants were male and 26.7% were female. About 21.7% of the participants had hypertension, 16.7% had diabetes and 20% were smoker. The group-wise distribution of age, gender and comorbid is given in Table 1.

In the initial week, Group A had higher incidence of wound infection (36.7%) compared to Group B (20%). The incidence of wound infection significantly increased in Group A, particularly notable in the second (73.3%) (p=0.001) and third weeks (60%) (p=0.001), while Group B maintained a lower rate of infection. At fourth week, 20.7% of the patients were still had infection, while in group B, none of the patients had infection (0%) (p=0.001). (Table 2)

In the initial week, a significant difference between the groups is observed for necrosis. For minor necrosis, Group A shows a high incidence rate of 77.3% (17 participants), compared to only 22.7% (5 participants) in Group B, with a p-value of 0.001, indicating statistical significance. Major necrosis was only reported in Group A, affecting all 5 participants (100%) identified with this condition, while Group B had no cases. Similar trends continue into the second week. For minor necrosis, 73.7% (14 participants) in Group A and 26.3% (5 participants) in Group B were observed, with the same statistically significant p-value of 0.001. All 10 cases of major necrosis occurred in Group A, with no instances in Group B. By the third week, the incidence of minor necrosis in Group A decreases slightly to 66.7% (8 participants), with Group B seeing an increase to 33.3% (4 participants). The p-value remains 0.001. Major necrosis rates stay constant, with 10 cases (100%) in Group A and none in Group B. The pattern observed in the third week continues into the fourth, with identical percentages of minor necrosis in both groups and all cases of major necrosis still occurring in Group A only.

The average hospital stay for Group A was significantly longer (16.66±3.16 days) compared to Group B (5.93±2.31 days), with a p-value of 0.001. (Figure 4)

Table-1: Baseline characteristics of the study participants (n=60)

Characteristics	Group A (n=30)	Group B (n=30)	Total (n=60)	p-value
Age (years)	36.06±11.89	35.33±10.61	35.7±11.18	0.802
Gender				
Male	20 (66.7%)	24 (80%)	44 (73.3%)	
Female	10 (33.3%)	6 (20%)	16 (26.7%)	0.243
Hypertension				
Yes	7 (23.3%)	6 (20%)	13 (21.7%)	
No	23 (76.6%)	24 (80%)	47 (78.3%)	0.754
Diabetes				
Yes	6 (20%)	4 (13.3%)	10 (16.7%)	
No	24 (80%)	26 (86.7%)	50 (83.3%)	0.488
Smoking				
Yes	5 (16.7%)	7 (23.3%)	12 (20%)	
No	25 (83.3%)	23 (76.7%)	48 (80%)	0.519

Table-2: Wound infection rates over time among both groups (n=60)

Wound infection	Group A	Group B	p-value
1st week	11 (36.7%)	6 (20%)	0.152
2nd week	22 (73.3%)	6 (20%)	0.001
3rd week	18 (60%)	3 (10%)	0.001
4th week	6 (20.7%)	0	0.01

Table-3: Incidence of necrosis over time in both groups (n=60)

Necrosis	Group A	Group B	p-value
1st week			
Minor	17 (77.3%)	5 (22.7%)	
Major	5 (100%)	0	0.001
2nd week			
Minor	14 (73.7%)	5 (26.3%)	
Major	10 (100%)	0	0.001
3rd Week			
Minor	8 (66.7%)	4 (33.3%)	
Major	10 (100%)	0	0.001
4th week			
Minor	8 (66.7%)	4 (33.3%)	
Major	10 (100%)	0	0.001

DISCUSSION

The reconstruction of groin defects after trauma or excision of lymph node presents a formidable challenge in reconstructive surgery, highlighting the important balance between effective management and the preservation of function and aesthetics.[10–12] In recent years, the tensor fascia lata (TFL) flap introduction by Wangensteen *et al*. has established itself as a versatile and dependable option for reconstructing groin defects, leveraging its anatomical reliability and the minimally morbid harvest site.[6,10,13–16] This study aimed to evaluate the efficacy of the TFL flap in groin defect reconstruction, focusing on outcomes such as wound infection, skin flap necrosis, and hospital stay duration compared to primary closure methods.

Our findings highlighted the superiority of the TFL flap reconstruction over primary closure in terms of reduced hospital stay and lower incidences of wound infection and skin flap necrosis. This aligns with recent advances and applications of the TFL and other fascia lata-based flaps in various reconstructive scenarios.[6,17,18] For instance, Pflibsen *et al*. demonstrated the efficacy of a composite anterolateral thigh and fascia lata free flap for abdominal and groin reconstruction in a paediatric patient, highlighting the flap's potential for complex reconstructions involving the groin.[19] Similarly, De Luna Gallardo *et al*. successfully utilized bilateral pedicled TFL flaps for massive abdominal wall defect repair, providing a viable alternative for primary or secondary abdominal wall reconstruction in selected cases.[20] Kiptoon and Wanjala's case series on local/regional flaps for extensive abdominal wall defects further exemplifies the adaptability and effectiveness of fascia lata-based reconstructions.[21,22] Nimral *et al*. revealed that TFL flap cover significantly reduced the incidence of major flap necrosis and minor necrosis compared to primary skin closure, with only 15% of TFL cases developing minor flap necrosis against 50% (25% major, 25% minor) in the primary closure group. This marked difference highlights the TFL flap's role in enhancing wound healing and reducing complications associated with groin dissections.[6] Tashiro *et al*. also found the use of TFL flaps, significantly reduced the incidence of postoperative chronic lower extremity lymphedema. Acute wound complications occurred in 32.0% of the flap reconstruction group compared to 46.7% in the non-flap reconstruction group, with no significant difference in infection rates between the groups. Chronic lower-extremity lymphedema occurred in 16.0% of the flap reconstruction group, significantly less than the 53.3% in the non-flap reconstruction group.[23]

Comparing our findings with these studies, we observe a consensus on the utility of the TFL and related flaps in managing not only groin defects but also extensive abdominal wall defects, thereby reaffirming our hypothesis on the flap's enhanced mobility and shorter hospital stays.[1,6,14,17,18,24,25] Moreover, our research contributes to the body of evidence supporting the fascia lata flap's versatility, including its application in complex cases where traditional methods may fall short.

However, our study is not devoid of limitations. The prospective observational nature of the study and the specific demographic (patients presenting at a tertiary care hospital in Karachi, Pakistan) might limit the generalizability of our findings. Additionally, while our research provides valuable insights into the TFL flap's advantages, a comparative analysis involving other flap types, such as the anterolateral thigh flap or sartorius muscle flap, could offer a more comprehensive view of the optimal reconstructive strategies for groin defects. In future, researchers could explore the comparative effectiveness of various fascia lata-based flaps in a broader spectrum of patients and settings. Randomized controlled trials comparing the TFL flap to other reconstructive options, including free flaps and synthetic

mesh, could further delineate the most effective strategies for specific defect characteristics. Moreover, long-term follow-up studies are essential to evaluate the durability of repair, functional outcomes, and patient satisfaction over time.

CONCLUSION

The tensor fascia lata flap's efficacy in the reconstruction of groin defects, offering a superior alternative to primary closure in terms of reduced complication rates and shorter hospital stays.

AUTHORS' CONTRIBUTION

SAB, FAAK: Literature search, conceptualization of study design. SAB, MN, SK, RF: Data collection. SAB: Data analysis, data interpretation, write-up. SAB, WS: Proofreading.

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