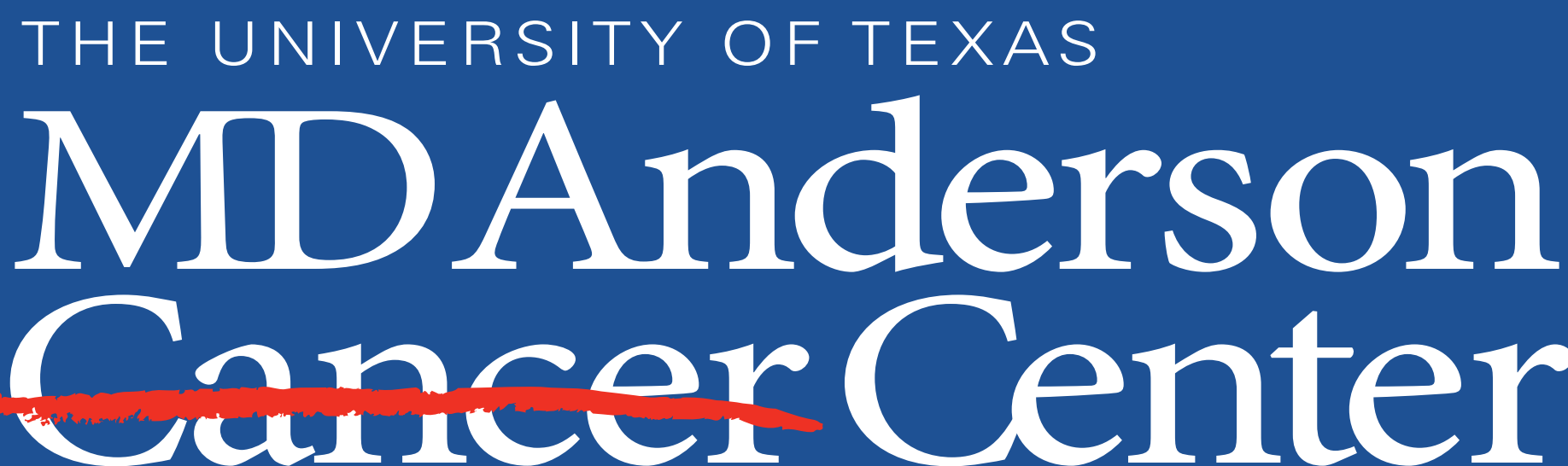




Outcomes of Free Tissue Transfer in Lower Extremity Soft Tissue Sarcoma Reconstruction: An Analysis at a Quaternary Cancer Center

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Background

Lower extremity soft tissue sarcomas (STS) requiring free tissue transfer (FTT) present distinct surgical complexities. Integrating healthy tissue with free flaps, however, has indicated superior healing outcomes. This research evaluates the outcomes of patients undergoing FTT for STS reconstruction in the lower extremity.

Hypothesis

Patients undergoing free tissue transfer for the reconstruction of lower extremity soft tissue sarcomas will exhibit superior healing outcomes, including reduced complication rates, compared to those receiving conventional reconstructive surgeries.

Methods

We conducted a a retrospective analysis was conducted on patients who underwent FTT for STS reconstruction in the lower extremity at MD Anderson between January 2016 and December 2021. Cross tabulation and chi square analysis were utilized.

Figure 1. Comparative Analysis of Free Flap Types Across Distinct Anatomical Regions

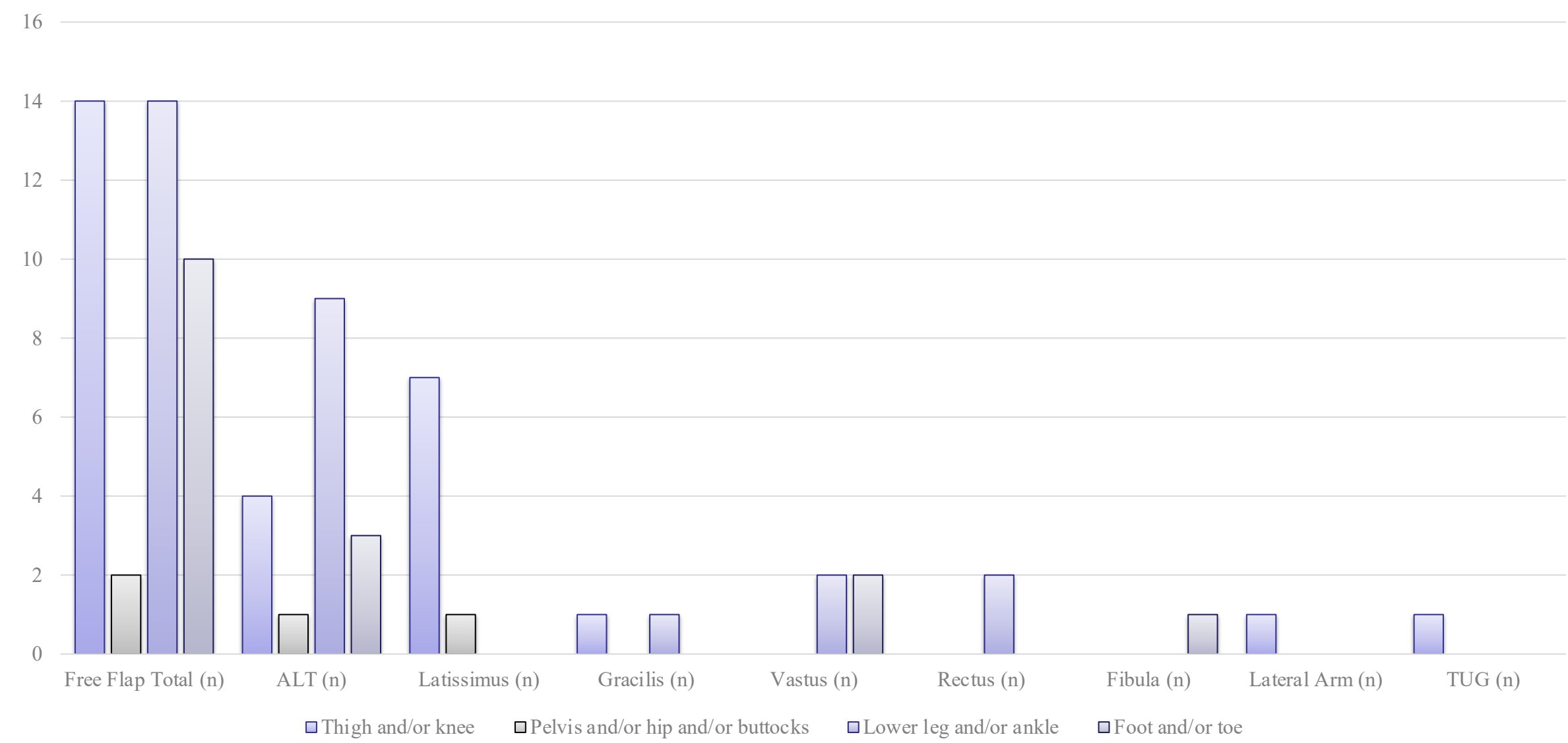


Table 1. Comparative Analysis of Complication Rates in Free Tissue Transfer and Non-FTT Patient Cohorts

Dependent Variable	Free Flap (n=40)	Non-free flap (n=262)*	p-value
Any Complication	5 (12.5%)	110 (42%)	< 0.001
Unanticipated Reoperation	5 (12.5%)	29 (11.1%)	0.8
Unanticipated Readmission	0 (0%)	12 (4.6%)	0.12
Surgical Site Infection	1 (2.5%)	42 (16%)	0.023
Seroma	0 (0%)	36 (13.7%)	0.01
Hematoma	1 (2.5%)	13 (5%)	0.5
Incisional Dehiscence	2 (5%)	54 (20.6%)	0.02
Graft Loss	1 (2.5%)	19 (7.3%)	0.26
Dressing Changes >6 weeks	2 (5%)	51 (19.5%)	0.02
Partial Flap Loss	1 (2.5%)	6 (2.3%)	0.93
Total Flap Loss	0 (0%)	0 (0%)	1
*Primary closure (n=31), Complex repair (n=100), Full thickness skin graft (n=10), local flap (n=21), or pedicled flap (n=100)			

Table 2. Comparative Demographics of Patients Undergoing Free Tissue Transfer Versus Non-FTT Procedures

Demographic Variable	Non-FTT Patients	FTT Patients	Statistical Test	p-value
BMI (mean ± 95% CI)	29.42 (28.66 to 30.19)	28.51 (26.66 to 30.36)	Mann-Whitney U	0.366
Age at Surgery (mean ± 95% CI)	57.08 (55.07 to 59.10)	57.59 (52.00 to 63.18)	Mann-Whitney U	0.657
Sex (female/male)	124/138 (47.3%/52.7%)	22/18 (55.0%/45.0%)	Pearson Chi-Square	0.399
Race	American Indian or Alaska Native Non-FTT: 2 (0.8%) Black or African American Non-FTT: 20 (7.6%) Native Hawaiian or Other Pacific Islander Non-FTT: 1 (0.4%) Other Non-FTT: 25 (9.5%) Unknown Non-FTT: 1 (0.4%) White or Caucasian Non-FTT: 204 (77.9%)	American Indian or Alaska Native FTT: 0 (0.0%) Black or African American FTT: 4 (10.0%) Native Hawaiian or Other Pacific Islander FTT: 0 (0.0%) Other FTT: 3 (7.5%) Unknown FTT: 0 (0.0%) White or Caucasian FTT: 29 (72.5%)	Fisher's Exact	0.517
Hypertension	117/262 (44.7%)	17/40 (42.5%)	Pearson Chi-Square	0.798
Type 2 Diabetes	42/262 (16.0%)	6/40 (15.0%)	Pearson Chi-Square	0.868
Coronary Artery Disease	39/262 (14.9%)	6/40 (15.0%)	Pearson Chi-Square	0.985
Active Smoker	13/261 (5.0%)	0/40 (0%)	Fisher's Exact	0.229
Renal Disease	5/262 (1.9%)	1/40 (2.5%)	Fisher's Exact	0.577
Presence of at least 1 comorbidity	147/262 (56.11%)	20/40 (50.0%)	Pearson Chi-Square	0.580
Preoperative Radiation Therapy	208/262 (79.39%)	35/40 (87.5%)	Pearson Chi-Square	0.320
Preoperative Chemotherapy	88/262 (33.59%)	9/40 (22.5%)	Pearson Chi-Square	0.220
Anatomic Location of Defect	Distal 1/3 Leg 15 (5.73%) Anterior Thigh 29 (11.07%) Middle 1/3 Leg 14 (5.34%) Posterior Thigh 46 (17.56%) Medial Thigh 73 (27.86%) Lateral Thigh 29 (11.07%) Anterior/Medial/Lateral Knee 13 (4.96%) Proximal 1/3 Leg 14 (5.34%) Buttock 15 (5.73%) Hip 7 (2.67%) Popliteal Fossa 8 (3.05%)	Distal 1/3 Leg 18 (45.00%) Anterior Thigh 6 (15.00%) Middle 1/3 Leg 6 (15.00%) Posterior Thigh 4 (10.00%) Medial Thigh 3 (7.50%) Lateral Thigh 2 (5.00%) Anterior/Medial/Lateral Knee 2 (5.00%) Proximal 1/3 Leg 2 (5.00%) Buttock 1 (2.50%) Hip 1 (2.50%) Popliteal Fossa 1 (2.50%)	Pearson Chi-Square	0.002

Results

Of the principal cohort consisting of 302 individuals, 40 patients were identified to have undergone FTT. Among the free tissue transfer subset comorbidities, diabetes was observed in 6 patients (15.0%), hypertension in 17 (42.5%), coronary artery disease in 6 (15.0%), and pulmonary disease in 2 (5.0%). None of the patients in this group were active smokers, and 1 patient (2.5%) had renal disease. Half of the patients, 20 (50.0%), had at least one comorbidity. Notably, 35 patients (87.5%) in the free tissue flap group received preoperative radiation therapy. The overall complication rate was significantly lower in the free flap group (12.5% vs. 42%, p<0.001). Specific complications, including surgical site infection (2.5% vs. 16%, p=0.023), seroma formation (0% vs. 13.7%, p=0.01), and incisional dehiscence (5% vs. 20.6%, p=0.02), were notably more prevalent in the non-free flap group. Additionally, the need for dressing changes beyond six weeks was significantly higher in the non-free flap group (5% vs. 19.5%, p=0.02). Other complications, such as unanticipated reoperations and graft loss, showed no statistically significant difference between the two groups.

Conclusion

Free flaps are associated with a significantly lower rate of any complication in the context of lower extremity sarcoma reconstruction. However, no notable difference was found in major complications or reoperative complications between the groups. The higher rate of surgical site infections and seromas in the non-free flap group may indicate challenges associated with closing larger defects without the benefits of vascularized distant tissue and/or potential complications arising from prior treatments, specifically radiation therapy. Furthermore, the evident disparity in complications like incisional dehiscence and prolonged need for dressing changes underscores the reliability of free flaps in achieving durable and stable wound closure. Thus, surgeons are advised to have a low threshold to employ FTT, as it seems to diminish the frequency of healing complications observed with simpler techniques in this patient group.

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