the operating room. Identifying independent risk factors for amputation following FTT can help in the decision-making process.

METHODS: A retrospective chart review identified all patients undergoing FTT to the lower extremity by the senior author (K.K.E.) between 2011 and 2018. One hundred thirty-five patients were included in the study, of which 117 patients (86.7%) had successful limb salvage and 18 patients (13.3%) received an amputation following FTT. Data collected included patient demographics, medical comorbidities, wound location, lower extremity angiography, and type of free flap.

RESULTS: Twelve men (66.7%) and 6 women (33.3%) underwent amputation following FTT, whereas 81 men (69.2%) and 35 women (29.9%) had successful limb salvage following FTT. Demographics between the groups were similar, including age (amputation: 54.3 ± 11.1, limb salvage: 54.7 ± 14.6; \( P = 0.8981 \)) and body mass index (amputation: 29.2 ± 5.8; limb salvage: 26.8 ± 3.6; \( P = 0.0911 \)). The most common comorbid conditions were hypertension (50.4%), diabetes mellitus (47.4%), and peripheral vascular disease (23.0%), and the most commonly utilized flap was the anterolateral thigh flap (53.3%). On univariate analysis, diabetes mellitus was associated with a 3.79 times increase in the risk of undergoing amputation (\( P = 0.0097 \); odds ratio [OR], 3.79; 1.05–13.75) and a 20 times increase in the risk of undergoing amputation following FTT (\( P = 0.0027 \); OR, 6.93; 1.55–30.89). The most common comorbidity conditions were hypertension (50.4%), diabetes mellitus (47.4%), and peripheral vascular disease (23.0%), and the most commonly utilized flap was the anterolateral thigh flap (53.3%). On univariate analysis, diabetes mellitus was associated with a 3.79 times increase in the risk of undergoing amputation (\( P = 0.0097 \); odds ratio [OR], 3.79; 1.05–13.75) and a 20 times increase in the risk of undergoing amputation following FTT (\( P = 0.0027 \); OR, 6.93; 1.55–30.89).

CONCLUSION: Many previous studies on this topic have centered on flap outcomes, success rates, and overall limb salvage rates. This is the largest series to report risk factors for amputation following FTT for limb-threatening defects. Our study finds that there are distinct risk factors that are associated with increased risk for amputation following FTT to the lower extremity. Poorly controlled diabetes mellitus and end-stage renal disease are associated with higher likelihood of amputation. Other factors, such as hindfoot wound location and gracilis flap reconstruction, also have a higher likelihood of requiring amputation. These findings may aide surgeons in choosing appropriate patients for FTT and predict those that are more likely to need amputation. Further evaluation with multi-institutional data may identify additional risk factors.

Comparative Effectiveness Analysis of Complex Lower Extremity Reconstruction: Outcomes and Costs for Biologic-based, Local Tissue Rearrangement, and Free Flap Reconstruction

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BACKGROUND: Lower extremity (LE) soft tissue reconstruction poses a significant surgical challenge, representing a heterogeneous and often complex clinical situation associated with high rates of failure and morbidity. Various surgical techniques exist for reconstruction, but limited high-quality data exist to inform treatment strategies and patient counseling. We aim to evaluate the effectiveness and cost of 3 common surgical reconstructive modalities for LE defects using a multi-institutional, longitudinal dataset and rigorous matching approach.

METHODS: All adult patients with LE wounds who underwent biologic wound matrix (BWM), local tissue rearrangements (LTRs), or free flap (FF) reconstruction were retrospectively reviewed (2010–2017). Cardinality matching balanced cohorts’ comorbidities and wound characteristics. Success for BWM was defined as providing an adequate wound bed for Split-thickness skin grafting, whereas success for LTR and FF was defined as not needing an additional coverage procedure. Graft success at 180 days was the primary outcome, whereas readmissions, reoperations, and costs were secondary outcomes.

RESULTS: A total of 501 subjects (166 BWM, 190 LTR, and 145 FFs) were evaluated. Average age of the entire cohort was 55.9 years old, and body mass index was 29.3 kg/m². Median wound size for BWM, LTR, and FF is as follows: 29.5, 30.0, and 120.0 cm² (\( P < 0.0001 \)), respectively. Median wound ages also differed significantly with BWM wounds (55 days) being much older than LTR (30...
it tends to be long, frequently widens, and hypertrophies. Scar can be camouflaged for women when wearing the bra.

Traditional open LD flap harvest requires a posterior donor site incision with a length of 15–45 cm. Although the scar can be camouflaged for women when wearing the bra, it tends to be long, frequently widens, and hypertrophies.

The purpose of this study was to introduce our 7-year experience with the robotic-assisted LD muscle flaps in autologous breast reconstruction.

PATIENTS AND METHODS: Between October 2012 and February 2019, a total of 33 patients underwent autologous breast reconstructions using robotic-assisted LD muscle flap. Among 33 patients, 21 patients had Poland syndrome. Seven and 3 patients underwent robotic-assisted LD flap following immediate and delayed breast reconstruction after mastectomy, respectively. Two patients had capsular contracture of implant. Subjective assessment was performed to evaluate satisfaction of overall outcome, breast symmetry, and scar. Mean follow-up time was 29.8 ± 12.5 months (range, 3–61 months).

RESULTS: All 33 flaps were successfully transferred without converting to open technique. As our experience with robotic-assisted LD flap increased steadily over the years, we have achieved improvements in surgical techniques and robotic instruments to comfort during surgery, optimize the results, and minimize complications and contour defects compared to the first time with robotic surgery. In addition, the time for robotic surgery system also markedly decreased after experience accumulation. Recently, the time for robotic docking and robotic surgery was about 408 versus 50 and 85 minutes for BWM and LTR, respectively; P < 0.001). Readmissions (odds ratio, 1.58; 95% CL, 0.95–2.61) and reoperations (odds ratio, 1.46; 95% CL, 1.00–2.15) were greater for FF. Amputation rates were highest for BWM (n = 15; 14.4%) compared to LTR (n = 6; 5.8%) and FF (n = 4; 3.8%) (P = 0.017). Using conditional logistic regression models, predicted probabilities of success demonstrated that LTR, if achievable, provides great success at low cost. FF was most effective with large, traumatic wounds but at higher costs and longer LOS. BWM was least effective but successfully treated older, obese patients without exposed bone at low costs and decreased LOS.

CONCLUSIONS: Data presented in this large, multi-institutional study highlight the relative clinical benefits of a customized surgical approach to LE reconstruction based on patient and wound characteristics. We effectively compare 3 treatment modalities using an advanced matching technique. We demonstrated that FF is the most successful reconstructive option; however, it leads to greater LOS, increased numbers of readmissions, reoperations, and high costs. Local autologous tissue rearrangements, if achievable, provide successful coverage at minimal costs and decreased readmissions and reoperations. BWM, although not as successful, can be effectively used in certain patient populations while reducing costs and decreasing LOS.

**Robotic-assisted Latissimus Dorsi Muscle Flap for Autologous Breast Reconstruction**

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**BACKGROUND:** Latissimus dorsi (LD) muscle flap has been widely used for autologous breast reconstruction. Traditional open LD flap harvest requires a posterior donor site incision with a length of 15–45 cm. Although the scar can be camouflaged for women when wearing the bra, it tends to be long, frequently widens, and hypertrophies with time. Therefore, a minimally invasive technique to harvest LD muscle flap via endoscopic approach has been developed. Despite continuous improvements in surgical techniques and technologies, 2-dimensional view and non-flexible instruments are limitations of endoscopic harvest of the LD muscle flap. Meanwhile, a robotic-assisted LD muscle flap has been first introduced for autologous breast reconstruction after mastectomy. The authors have demonstrated a modified robotic surgical technique using a trans-axillary gasless technique for robot-assisted LD muscle flaps in 2012. The purpose of this study was to introduce our 7-year experience with the robotic-assisted LD muscle flaps in autologous breast reconstruction.

REFERENCE:

1. Arslan E, Unal S, Demirkan F, et al. Poland’s syndrome with rare deformities: reconstruction with latissimus dorsi muscle through a single short incision. Scand J Plast Reconstr Surg Hand Surg. 2003;37:304–306.

2. Moore TS, Farrell LD. Latissimus dorsi myocutaneous flap for breast reconstruction: long-term results. Plast Reconstr Surg. 1992;89:666–672; discussion 673–664.

3. Pomel C, Missana MC, Atallah D, et al. Endoscopic muscular latissimus dorsi flap harvesting for immediate...