Wounds developed post-FTT in 70.3%. The original ulcer recurred in 39.1% while transfer lesions developed in 43.8%. Median time to transfer lesion development was 3.7 months. On bivariate analysis, neither tripod (P = 0.104), first metatarsal (P = 0.053), nor fifth metatarsal (P = 0.198) defects had significant relationships with increased odds of transfer lesion development. Calcaneal defects also did not exhibit a significant relationship with transfer lesion development (P = 0.939). Diabetes (P = 0.043) and plantar weightbearing defect (P = 0.045) exhibited significant relationships with transfer lesion development. On multivariate analysis, both first metatarsal (odds ratio [OR], 7.2; 95% CI, 1.6–31.8) and plantar weightbearing defects (OR, 4.6; 95% CI, 1.1–19.1) were independently associated with increased odds of transfer lesions (P = 0.043) and plantar weightbearing defect (P = 0.045) exhibited significant relationships with transfer lesion development. On multivariate analysis, both first metatarsal (odds ratio [OR], 7.2; 95% CI, 1.6–31.8) and plantar weightbearing defects (OR, 4.6; 95% CI, 1.1–19.1) were independently associated with increased odds of transfer lesions (P = 0.043) and plantar weightbearing defect (P = 0.045) exhibited significant relationships with transfer lesion development. Diabetes was no longer a significant predictor for transfer lesion development.

CONCLUSIONS: Defects of the load-bearing tripod, particularly the first and fifth metatarsal, significantly increase the risk of transfer lesion development after FTT. While solely soft tissue reconstruction with FTT achieves success in the short term, transfer lesions occur at high rates in the months to years following initial healing. Use of composite osteocutaneous flaps may be valuable in this population to decrease transfer lesion risk by achieving both bony and soft tissue reconstruction.

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The Addition of Fluorescence to the University of Wisconsin “Blue-Blood” Chicken Thigh Model Significantly Enhances Its Effectiveness As a Supermicrosurgery Training Tool

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BACKGROUND: The skills required for supermicrosurgery are hard earned and difficult to master. The University of Wisconsin “blue-blood” chicken thigh model has proven to be an excellent source of small vessels (down to 0.25 mm) but assessing the quality of anastomoses at this spatial scale has proven difficult. Without the capacity for self-assessment, the chicken thigh model becomes a much less effective training tool. We evaluated whether augmentation of this realistic training model with fluorescent imaging would enhance assessment of supermicrosurgical anastomoses, and therefore improve real-time feedback to trainees.

METHODS: White light with and without fluorescence imaging overlay captured the infusion of colored saline and fluorescent indocyanine green “blood” through the vessels (n = 7 with diameters ranging from 0.35 to 0.55 mm). Videos with and without fluorescence overlay were separated, randomized, and shown to 7 fellowship-trained microsurgeons at the University of Wisconsin-Madison who rated each anastomosis as “patent”, “not patent” or “unsure.” Surgeon accuracy, uncertainty, and inter-rater agreement were measured to evaluate the effectiveness of each imaging modality for assessing supermicrosurgical anastomoses. Staff opinion regarding the use of fluorescent imaging was also polled using a Likert scale.

RESULTS: When assessing the quality of supermicrosurgical anastomoses, the use of fluorescence significantly increased surgeon accuracy to 91% compared with 47% with white light alone (P = 0.015), significantly decreased surgeon uncertainty to 4% compared to 41% with white light alone (P = 0.011), and significantly improved inter-rater agreement to 91.2% compared with 53.0% with white light alone (P = 0.016). Additionally, 100% of participating surgeons “strongly agreed” that the use of fluorescence improved their ability to assess the patency of anastomoses. All of the participating surgeons either “agreed” (43%), or “strongly agreed” (57%) that the use of fluorescence improved their ability to assess for anastomotic leaks.

CONCLUSIONS: Augmentation of the University of Wisconsin “blue-blood” chicken thigh model with indocyanine green fluorescence significantly improves accuracy, decreases uncertainty and improves inter-rater agreement when assessing supermicrosurgical anastomoses in a training setting. Now, with fluorescence, the “blue-blood” chicken thigh model is capable of providing high quality, real-time feedback at the supermicrosurgery scale, redeeming it as an effective training tool for supermicrosurgery skills.

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Implementation of a Stratified Anticoagulation Protocol Increases Lower Extremity Free Tissue Transfer Success in the Setting of Thrombophilia

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BACKGROUND: Optimal perioperative thromboprophylaxis is crucial to achieve high rates of microsurgical success in the highly comorbid chronic wound population. After implementation of a risk-stratified anticoagulation protocol at our institution, our preliminary data indicated that the new protocol contributed to significant reductions in postoperative thrombotic events and flap loss. We present an updated analysis of lower extremity free tissue transfer (FTT) outcomes and the utility of risk-stratified anticoagulation.

METHODS: A retrospective review of lower extremity FTT at our institution from 2011 to 2019 was performed. Demographics, comorbidities, chemoprophylaxis regimens, and FTT characteristics were collected. Patients were divided into 2 cohorts based on the institution of a risk-stratified anticoagulation protocol in July 2015. Under this protocol, weight-based heparin infusions were utilized for patients with intraoperative risk factors for microvascular thrombosis (arterial calcification, pedicle thrombosis, or anastomotic revision). In the absence of intraoperative findings, patients were stratified to subcutaneous heparin or fixed-dose heparin infusion based on historical (venous thromboembolism, cerebrovascular accident, or myocardial infarction) and hematologic (≥3 hypercoagulable traits) risk factors. Outcomes of interest were blood transfusion volume and flap success. Multivariate logistic regression was used to produce adjusted odds ratios for flap success using a backwards model.

RESULTS: We identified 148 LE FTT procedures performed for lower extremity salvage in patients who had detectable hypercoagulable traits on preoperative screening. Median age at time of FTT was 58 years old (interquartile range [IQR], 47–66). Median Charlson Comorbidity Index was three (IQR, 2–4.5). Median number of hypercoagulable traits was two (IQR, 2–3). Eighty-two percent of FTT procedures were managed with the stratified anticoagulation protocol. Patients in the stratified cohort received intravenous heparin significantly more often (55.4% versus 7.4%; P = 0.005) and had higher rates of flap success (97.5% versus 81.5%; P = 0.005). Incidence of postoperative thrombosis (2.5% versus 11.1%; P = 0.074) and FTT takeback (3.3% versus 11.1%; P = 0.114) was decreased in the risk-stratified group but not statistically significant. Volume of transfused blood products within 5 days after FTT was not significantly different (median [IQR], 0 [0–642] versus 350 [0–700] ml; P = 0.139) between groups. On multivariate analysis, use of stratified anticoagulation protocol (odds ratio [OR], 11.3; 95% CI, 1.9–67.2) was associated with increased flap success. Occurrence of anastomotic revision (OR, 0.16; 95% CI, 0.03–0.96) and increasing number of hypercoagulable traits (OR, 0.46; 95% CI, 0.25–0.85) were associated with decreased flap success.

CONCLUSIONS: Hypercoagulability has a significant impact on microsurgical outcomes. Implementation of a standard preoperative panel for common hypercoagulable traits and intraoperative risk factors successfully guide a risk stratified anticoagulation protocol, which has contributed to significant improvements in flap success without creating an increased need for blood transfusion.

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