Outcomes Related to Ankle and Calf Soft Tissue Envelope in Total Ankle Arthroplasty

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INTRODUCTION: Increased periarticular soft tissue envelope and soft tissue thickness have been associated with increased risk of infection and surgical complications in primary total knee arthroplasty. Multiple studies have found worse survivorship in patients who have undergone total ankle arthroplasty (TAA) with larger body mass index (BMI), however the role of the soft tissue envelope in TAA remains underexplored. To date, only one retrospective study of 197 patients has examined this relationship in TAA and found no significant correlation between ankle soft tissue thickness and wound complications. The purpose of this study was to investigate the relationship between soft tissue envelope of the ankle and calf and perioperative complications in patients undergoing TAA.

METHODS: This retrospective study analyzed 124 patients who underwent primary TAA at a single academic center between December 2015 and May 2024. Preoperative anteroposterior (AP) and lateral radiographs were analyzed for the following soft tissue measurements: thickness at the joint (STT), 10cm above the joint (STT10), 15cm above the joint (STT15), and thickness anterior to the joint. Complications analyzed were infection or wound complications, perioperative fracture, hardware loosening, dislocation, deep vein thrombosis, chronic pain requiring narcotics, and postoperative stiffness. Point Biserial Correlation was used to assess the relationship between preoperative soft tissue envelope and complications.

RESULTS:

Postoperative infection was found to weakly and negatively correlate with the following ratios: AP STT15 to AP STT (r=-0.256, p=0.020, 95% confidence interval [CI] -0.447- -0.042%) and lateral STT to anterior joint thickness (r=-0.194, p=0.034, -0.361- -0.015%). The ratio between AP and lateral STT15 was found to moderately correlate with revision surgery (r=0.320, p=0.020, 0.053-0.546%). Anterior joint thickness was found to weakly correlate with postoperative dislocation (r=0.207, p=0.024, 0.028-0.373%). BMI was not found to correlate with postoperative infection (r=-0.124, p=0.169, -0.294-0.053%) or revision surgery (r=-0.087, p=0.337, -0.259-0.091%). BMI was found to weakly and negatively correlate with dislocation (r=-0.178, p=0.048, -0.344- -0.002%) and perioperative fractures (r=-0.180, p=0.046, -0.345- -0.004%).

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DISCUSSION AND CONCLUSION: Patients in this cohort demonstrated that soft tissue envelope is a better predictor of postoperative infection, dislocation, and revision surgery than BMI. Patients' soft tissue envelope may be an important risk factor for complications after TAA. Measurements corresponding to a patient's preoperative soft tissue envelope at the calf and at the ankle may be an underutilized tool to assess potential risks associated with primary TAA.

Measurement	Complication	Correlation	r	p	95% Confidence Interval
AP STT15 to AP STT	Postoperative infection	Negative, weak	-0.256	0.020	-0.447 - (-0.042)
lateral STT to anterior joint thickness	Postoperative infection	Negative, weak	-0.194	0.034	-0.361 - (-0.015)
AP to lateral STT15	Revision surgery	Positive, moderate	0.320	0.020	0.053 - 0.546
Anterior joint thickness	Postoperative dislocation	Positive, weak	0.207	0.024	0.028 - 0.373
BMI	Postoperative infection	None	-0.124	0.169	-0.294 - 0.053
BMI	Revision surgery	None	-0.087	0.337	-0.259 - 0.091
BMI	Dislocation	Negative, weak	-0.178	0.048	-0.344 - (-0.002)
BMI	Perioperative fracture	Negative, weak	-0.180	0.046	-0.345 - (-0.004)

Table 1. How Soft Tissue Measurements Correlate to Postoperative Complications in TAA