Outcomes following Transtibial Meniscus Root Repair are not Affected by Preoperative Coronal Plane Alignment

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INTRODUCTION:

Meniscal root tears, defined as a radial tear occurring within 1 cm of meniscal attachment or an avulsion of the meniscus attachment site to bone, comprise up to 20% of meniscal injuries. Previous studies have identified patient demographics such as Body Mass Index (BMI), age, sex, and lower extremity coronal plane alignment as important factors that can impact clinical outcomes after meniscal root repairs. However, there is no standardized set of guidelines to identify proper surgical candidates for meniscal root repair based on coronal plane alignment. The purpose of this study was to evaluate the impact of coronal plane alignment on outcomes of root repair. We hypothesized that patients with lateral root repairs performed in a valgus knee or medial root repairs performed in a varus knee ("at-risk" group) would report worse patient-reported outcomes.

METHODS: Patient demographic and surgical data were retrieved from chart review of all meniscus repairs performed at an academic center between 2006 and 2018. Patients between 18 and 65 years old with adequate full length weight-bearing radiographs for measuring the mechanical axis were included. Patients were contacted to complete patient-reported outcome measures (PROM): Knee Injury and Osteoarthritis Outcome Score (KOOS) and International Knee Documentation Committee subjective score (IKDC). Patients with varus alignment (> 3 degrees) and a medial root repair, or valgus alignment (>3 degrees) and a lateral root repair were considered at-risk. PROMs were compared between at-risk groups versus patients within 3 degrees of neutral mechanical axis. Independent t-tests for continuous variables and chi-squared test for categorical variables were utilized to analyze relationships among body mass index subgroups, level of malalignment, PROMs, and complications.

RESULTS:

A total of 62 patients who underwent transtibial meniscus root repair were identified. Twenty patients met inclusion criteria, of which 9 patients (45%) were considered "at-risk" with varus-aligned knees with medial root tears. Patients at-risk of failure had a greater absolute mean mechanical axis (-6.8 degrees) when compared to patients not at-risk of failure (-0.091 degrees) ($p< 0.001$). Additionally, patients at-risk of failure had a shorter length of mean follow-up time (13.0 months) when compared to patients not at-risk of failure (15.3 months) ($p=0.005$). No significant differences were noted between the groups in patient age, sex, BMI, or PROMs (Table 1).

DISCUSSION AND CONCLUSION:

This study assesses the implications of demographic variables and coronal plane alignment on outcomes of meniscal root repair and provides additional guidelines to the literature to appropriately identify proper surgical candidates. Although more studies are needed to confirm these findings, this study demonstrates no associated differences in outcome of root repair based on coronal plane alignment.

Table 1: Comparison of Demographics and Patient-Reported Outcome Measures (PROMs) Following Transtibial Meniscus Root Repair

	At-risk group (n=9)	Not at-risk group (n=11)	Significance
Age, mean ± SD	54.3 ± 5.3	47.5 ± 14.6	p = 0.20
Sex, n (%)			p = 0.10
Male	2 (22%)	0 (0%)	
Female	7 (78%)	11 (100%)	
BMI, mean ± SD	31.1 ± 6.4	29.2 ± 7.8	p = 0.58
Mean Follow-Up, months (range)	13.0 (4.2 to 23.7)	15.3 (4.2 to 33.3)	p = 0.005
Mean Mechanical Axis, degrees (range)	-6.8 (-10 to -4)	-0.091 (-3 to 2)	p < 0.001
KOOS-Pain	83 ± 17.7	88 ± 14.0	p = 0.49
KOOS-Symptoms	76 ± 18.3	87 ± 15.5	p = 0.16
KOOS-ADL	87 ± 16.7	94 ± 9.0	p = 0.29
KOOS-Sports/Rec	63 ± 35.9	77 ± 25.8	p = 0.82
KOOS-QOL	62 ± 32.1	65 ± 24.0	p = 0.16
IKDC	60 ± 26.5	70 ± 17.9	p = 0.35