Medial Meniscus Root Repair Demonstrates Superior Radiographic and Clinical Outcomes at Long-Term Follow-Up Compared to Partial Medial Meniscectomy

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INTRODUCTION: Posterior medial meniscus root tears (PMMRTs) are frequently observed injuries that lead to alterations in tibiofemoral biomechanics. Few long-term reviews have considered the long term clinical and radiographic outcomes of management of these injuries. This study sought to perform a systematic review and meta-analysis of the current literature on long term clinical and radiographic outcomes of PMMRTs.

METHODS:

Using PRISMA guidelines, a systematic review was performed with inclusion criteria of English language studies, diagnosis of PMMRT on MRI with confirmation on arthroscopy if managed operatively, studies with minimum 5-year radiographic or patient reported outcome metrics. Data including management strategy, surgical technique, meniscal extrusion, medial compartment joint space, patient reported outcome scores (PROs), and radiographic measurements were analyzed. Failure was defined as conversion to arthroplasty, subsequent PMM and/or proximal tibial osteotomy, or clinical failure on PROs. Continuous outcomes variables were analyzed with a random effects meta-analysis of mean differences. Chi-squared meta-analysis was also used to analyze categorial variables when appropriate.

RESULTS:

A total of 13 studies were identified that reported on > 5-year (mean, 84.2 ± 11.2 months) follow-up after PMMRT. One study implemented conservative management, 5 studies performed partial medial meniscectomy (PMM), 6 studies performed medial meniscus root repair (MMR), and one study utilized either meniscectomy or repair. Among repairs, 5 studies utilized a transosseous repair while 1 study used anchors. There were 844 total patients, including 693 females (82.1%), with mean ages ranging from 47.2-65. On meta-analytics there were no significant differences between demographic variables between the PMM and MMR cohorts. Both PMM (Lysholm: pre-, 56.1 vs post, 68.2, p <0.01) and MMR (Lysholm: pre-, 52.1 vs post, 83.1; IKDC: 40.0 vs 72.8, p <0.01) showed significant PRO improvements after surgery. Both groups demonstrated worse radiographic outcomes at latest available follow-up, PMM (Kellgren-Lawrence 1.2 vs 2.4; medial joint pace, 4.0 mm vs 2.4 mm, p < 0.01) and MMR (Kellgren-Lawrence 1.0 vs 1.8; medial joint pace, 4.7 mm vs 3.9 mm, p < 0.01). Medial meniscus root repair was found to have significantly lower Kellgren-Lawrence scores (PMM, 2.4 vs MMR, 1.8, p < 0.01) and superior IKDC scores (PMM, 46.5 vs MMR, 72.8, p < 0.01) compared to PMM. Additionally, PMM had a significantly higher failure rate (23% vs 5.3%) and conversion to knee arthroplasty (20.5% vs 3.5%) compared to MMR, with odds ratio of 9.8 and 10.2, respectively.

DISCUSSION AND CONCLUSION:

This systematic review and meta-analysis of studies with > 5-year minimum follow-up found that PMM was associated with a 10-fold increase in both clinical failure and conversion to knee arthroplasty in comparison to MMR. In addition, MMR demonstrated superior Kellgren-Lawrence grades and IKDC scores compared to PMM. The findings of the current analysis suggest the superiority of MMR over PMM is maintained at mid- to long- term follow-up.

	Meniscectomy	Repair	Significance
Lysholm Pre	56.1 [47.5, 64.6]	52.1 [50.7, 53.6]	0.43
Lysholm Post	68.25 [53.68, 82.82]	83.1 [81.8, 84.3]	0.07
IKDC Pre	39.0 [36.1, 41.9.0]	40.0 [38.6, 41.4]	0.72
IKDC Post	46.5 [39.8, 53.1]	72.8 [69.7, 75.8]	**<0.001**
K/L score Pre	1.2 [1.0, 1.5]	1.0 [0.9, 1.2]	0.13
K/L score Post	2.4 [2.2, 2.6]	1.8 [1.4, 2.2]	**0.001**
Medial Joint Space Pre	4.0 [3.4, 4.5]	4.7 [4.6, 4.9]	**<0.001**
Medial Joint Space Post	2.44 [1.7, 3.2]	3.9 [3.7, 4.2]	**<0.001**
Total Knee Arthroplasty	105 (20.5%)	10 (3.5%)	**OR: 10.2 [4.7, 22.2]**
Failure	118 (23.0%)	15 (5.3%)	**OR: 9.8 [4.5, 21.4]**