Suture-Only Fixation of Meniscal Allograft Is Associated with a Higher Reoperation Rate Than Bony Fixation Techniques

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INTRODUCTION:
Meniscal allograft transplantation (MAT) is indicated for active patients with symptomatic meniscal deficiency. Various graft fixation techniques, including bone plugs, bone bridge-in-slot, and suture-only fixation, have been described. Despite the growing popularity of suture-only fixation, its comparative outcomes remain unclear. This study investigates the relationship between graft fixation techniques and reoperation rates following MAT, hypothesizing that suture-only fixation would be associated with higher reoperation rates compared to bone-based techniques.
METHODS:
A retrospective review identified 139 patients who underwent MAT at a single academic center. Demographics, fixation techniques (bone plug, bone bridge-in-slot, suture-only), and subsequent ipsilateral knee surgeries were recorded. Statistical analyses assessed the influence of fixation techniques and other factors (age, BMI, race, prior surgeries, concomitant procedures) on reoperation rates, with significance set at $P < 0.05$.
RESULTS:
The study included 139 patients (53.96% male; mean age: 29.4 ± 10.03 years; BMI: 27.33 ± 5.57) with a mean follow-up of 6.62 ± 3.13 years. Lateral MAT was performed in 51.08% of cases. Patients undergoing suture-only fixation had significantly higher reoperation rates (19/48, 39.58%) compared with bone bridge-in-slot (8/45, 17.78%) and bone plug (8/46, 17.39%) fixation ($P = 0.0202$). Meniscectomy (15/35, 42.86%) and meniscal repair (7/35, 20.0%) were the most common reoperations. Transplant failure occurred in 3/48 (6.25%) suture-only cases, requiring total knee arthroplasty (2 patients) or MAT revision (1 patient). Bone bridge-in-slot failure was observed in 1/45 (2.22%) cases, while no failures occurred in the bone plug group ($P = 0.18$).
DISCUSSION AND CONCLUSION:
Suture-only fixation was associated with significantly higher reoperation rates compared with bone bridge-in-slot and bone plug fixation. The most common reoperations were meniscectomy and meniscal repair. Surgeons should consider these findings when selecting fixation methods and counseling patients on MAT outcomes.

Table 1: Surgical History, Characteristics, and Reoperation Rate by MAT Fixation Method

Fixation Technique	Suture Only	Bone Plug	Bone Bridge-in-Slot	Total
MAT Count	48	46	45	139
Prior surgeries	22 (46%)	23 (50%)	17 (38%)	62 (44.6%)
Concomitant Procedures	14 (29%)	22 (48%)	11 (24%)	47 (33.81%)
Reoperations	19 (39.58%)	8 (17.39%)	8 (17.78%)	35 (25.18%)
Subsequent Meniscectomy or Meniscal Repair	13/19 (68.42%	5/8 (62.5%)	4/8 (50%)	22/35 (62.86%)
Failure (Revision or TKA)	3 (6.25%)	0	1 (2.22%)	4 (2.88%)
Medial Compartment MAT	21 (30.88%)	40 (58.82%)	7 (10.29%)	68
Lateral Compartment MAT	27 (38/03%)	6 (8.45%)	38 (53.52%)	71

Table 2: Univariate and Multivariate Analysis of Factors Influencing Risk of Subsequent Knee Surgery

Univariate Analysis	
Variable	**P-Value**
MAT Fixation Technique	**0.0202**
Follow-Up Time	**0.0239**
Concomitant Procedures	0.221
Age at Surgery	0.526
Sex	0.259
BMI	0.139
Race	0.329
Prior Surgery	0.586
Multivariate Analysis	
Variable	**P-Value**
MAT Fixation Technique	**< 0.0001**
Concomitant Procedures	**0.0001**
Age at Surgery	0.0647
Sex	0.404
BMI	0.099
Race	**0.0043**
Prior Surgery	0.089