

Midterm Outcomes of Meniscal Allograft Transplantation in the Adolescent Population

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INTRODUCTION: Studies of meniscal allograft transplantation (MAT) in adolescent patients have demonstrated safety and efficacy, with postoperative improvements in pain, function, and activity levels. However, outcomes are limited by short-term follow-up and/or small cohort sizes. The purpose of this investigation was to study clinical outcomes following MAT in adolescents at a minimum five-year follow-up. Our hypothesis was that adolescent patients undergoing primary MAT would demonstrate significant and durable mid-term improvements in clinical outcomes and satisfactory reoperation- and revision-free survival.

METHODS: A retrospective review of prospectively collected data was performed to identify adolescent patients aged 18 years old or younger who underwent primary MAT from 1999-2016. Inclusion criteria consisted of (1) primary MAT and (2) minimum 5-years follow-up. Exclusion criteria included the presence of inflammatory arthropathy. All MAT procedures were performed by the senior author with frozen, non-irradiated meniscal grafts fixated using the bridge-in-slot technique. Lysholm, International Knee Documentation Committee (IKDC), and Knee Injury and Osteoarthritis Outcome Score (KOOS) subscales were collected preoperatively and at 1-year, 2-year, and a minimum of 5-year follow-up. Reoperation was defined as a subsequent surgical intervention of the transplanted meniscus, including partial or total meniscectomy or meniscal repair. Failure was defined as revision MAT or conversion to arthroplasty.

RESULTS:

Forty-four of 62 identified patients (71%) undergoing MAT met inclusion criteria with a mean follow-up of 9.5 ± 3.8 years (range: 5.0-17.7). 11 patients (25%) were diagnosed preoperatively with a discoid lateral meniscus tear. Lateral and medial MAT was performed in 36 (82%) and 8 (18%) patients, respectively. Isolated MAT was performed in 27 (61.3%) of patients. The most common concomitant procedures at time of MAT were osteochondral allograft transplantation (n=14, 31.8%), autologous chondrocyte implantation (n=8, 18.1%), and anterior cruciate ligament reconstruction (n=6, 13.6%). At most recent follow-up, patients demonstrated significant improvements in all validated patient reported outcome measures (p < .021) when compared to baseline. 14 (32%) patients underwent a reoperation on the transplanted meniscus at a mean time of 5.06 ± 4.3 years (range: 0.75-14). The most common reoperation was partial meniscectomy (n=8), followed by total meniscectomy (n=5), and meniscal repair (n=1). Survivorship free from reoperation at 1, 2, 5, and 10 years was 95.5%, 90.9%, 79.5%, 71.3%, respectively. Three (n=3/44, 6.8%) of the 14 patients who required a reoperation ultimately failed treatment and were treated with revision MAT at an average of ----3.8 ± 1.1 years (range: 2.8-4.9) postoperatively. No patients were converted to arthroplasty. Survivorship free from failure at 2 and 5 years was 100% and 93.2%, respectively. Log-rank testing found no difference in survivability or reoperation based on sex, worker's compensation status, concomitant surgery, smoker status, or meniscus laterality.

DISCUSSION AND CONCLUSION: Adolescent patients undergoing MAT demonstrated significant and durable improvements in pain and function as well as satisfactory survivorship free of reoperation and revision at minimum 5-year follow-up. Patients and guardians should be counseled that while reoperation rates may approach 20% at 5 years status post-transplant, overall revision and failure rates remain low at mid-term follow-up.

Preoperative and Postoperative Patient Reported Outcomes

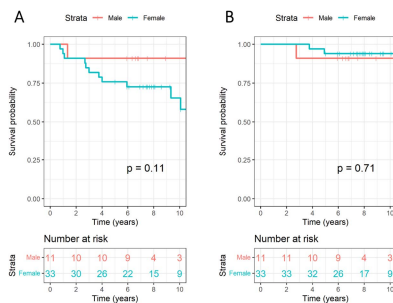
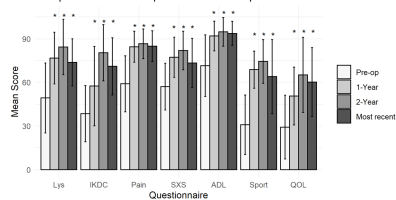


Table 1: Demographics and Intraoperative Variables

Characteristic	Post-op			p-values	
	None, n (%)	Reop, n (%)	Fail, n (%)	None vs. Reop ¹	None vs. Failure ²
Sex (female)	20 (67%)	11 (100%)	2 (67%)	0.039	>0.999
Age (years)	16.29 ± 1.11	15.90 ± 1.16	15.53 ± 2.16	0.303	0.504
BMI	24.1 ± 2.9	21.6 ± 4.3	23.4 ± 3.6	0.072	0.810
Meniscus transplanted	24 (80%)	8 (73%)	3 (100%)	0.660	>0.999
Concomitant procedure	21 (81%)	5 (45%)	1 (33%)	0.051	0.136
OCA	12 (40%)	1 (9%)	1 (33%)	0.127	>0.999
ACL	5 (17%)	3 (27%)	0 (0%)	0.660	>0.999
HTO	1 (3.3%)	0 (0%)	0 (0%)	>0.999	>0.999
DFO	4 (13%)	0 (0%)	0 (0%)	0.559	>0.999
MFJ	3 (10%)	0 (0%)	0 (0%)	0.551	>0.999
ACLR	5 (17%)	1 (9%)	0 (0%)	>0.999	>0.999

¹categorical variables listed as n (% of respective cohort); continuous variables listed as mean ± SD
²Fisher's exact test; Wilcoxon rank sum test
 Reoperations consist of any surgery related to the transplanted meniscus (evaluation due to meniscal symptoms, debriement, meniscectomy) excluding revision meniscal allograft transplantation. Failure defined revision meniscal allograft transplantation.