

Outcomes following Revision Osteochondral Allograft Transplantation of the Femoral Condyles at 5-Year Minimum Follow Up: A Matched Cohort Analysis

Zachary D Meeker¹, Derrick Knapik, Kyle R Wagner, Ron Gilat, Eric J Cotter, Allen Ali Yazdi, Alexander Weissman, Adam Blair Yanke², Brian J Cole³

¹Orthopedics, ²Rush University Med Ctr, ³Rush University Medical Center

INTRODUCTION:

Few studies have reported on midterm (5-year) outcomes following revision osteochondral allograft (OCA) transplantation. Therefore, the aim of this study is to investigate 5-year outcomes following revision OCA transplantation and compare outcomes with a matched control group of primary OCA patients. We hypothesize that patients undergoing revision OCA transplantation for the treatment of failed primary OCA transplantation will have improved patient-reported outcomes and similar survivorship free from failure when compared to those undergoing primary OCA.

METHODS: A retrospective review of prospectively collected data was performed to identify patients undergoing revision OCA transplantation of the femoral condyles between 1999-2018 with 5-year minimum follow up. A 1:2 cohort of matched primary OCA patients with respect to defect size, age, and body mass index (BMI) served as a control group. Lysholm, International Knee Documentation Committee (IKDC), and Knee Injury and Osteoarthritis Outcome Score (KOOS) subscales were collected, as well as reoperations or failures. Reoperation was defined as any subsequent surgery in the index compartment. Failure was defined as subsequent arthroplasty or revision cartilage procedure. Previously-determined thresholds for achieving clinically significant outcomes were utilized.

RESULTS:

A total of 15 patients undergoing revision OCAs were successfully matched to 30 primary OCA patients and were followed for a mean 9.3 ± 3.0 years (range: 5.1 - 14.7). Mean revision OCA patient age was 31.1 ± 9.7 years (range: 19.9 - 52.7) with a mean BMI of 25.9 ± 3.4 kg/m² (range: 20.8 - 30.4). Lateral OCA was performed in 53% of cases (n = 8/15), while 73% (n = 11/15) underwent a concomitant procedure. The mean time between initial and revision OCA was 2.9 ± 1.4 years (range: 1.2-6.2). Subsequent reoperation was performed in 60% (n = 9/15) of cases at a mean time of 4.7 ± 4.2 years (range: 0.6 - 11.2) following revision OCA. Failures were observed in 13% (n = 2/15) of revision OCA patients, requiring total knee arthroplasty at a mean time of 4.9 ± 3.4 years (range: 2.9 - 8.9). Survivorship free from reoperation (p = .568) and failure (p = .753) did not significantly differ between primary and revision groups. At 5-year minimum, patient acceptable symptomatic state (PASS) was achieved by a majority of revision OCA patients for IKDC (70%), Lysholm (83%), and KOOS subset questionnaires (Symptoms [70%], Pain [100%], Activities of Daily Living [80%], Sport [90%], and Quality of Life [80%]).

DISCUSSION AND CONCLUSION: At a mean follow up of 9.3 years, 67% of patients undergoing revision OCA required reoperation, with 13% undergoing arthroplasty. Survivorship free from failure and reoperation was not different between those undergoing primary or revision OCA. Achievement of PASS was observed for multiple outcome measures in those undergoing revision OCA. The primary finding from this investigation was that revision OCA demonstrates improvement in clinical outcomes and durability at minimum 5-year follow up. While reoperation rates approach 50% at 10 years, overall conversion to arthroplasty rates remains low at mid-term follow up. Survivorship free from reoperation and failure did not significantly differ from a matched cohort of those who underwent primary OCA. Therefore, our hypothesis was confirmed, as patients undergoing revision OCA had clinical improvement and comparable survivorship free from reoperation and failure compared to primary OCA patients.

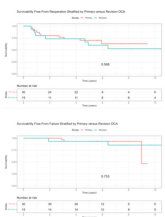


Figure 1: Two-estimator Kaplan-Meier survival analysis for reoperation and failure (revision versus primary) on IKDC, Lysholm, and KOOS. For patients who underwent revision and primary OCA, survival curves for reoperation were 80% (95% CI 66-94) and 83% (95% CI 70-96), respectively. Overall survival from time from OCA was 83% (95% CI 70-96) and 86% (95% CI 74-98), respectively. Overall survival from time from OCA was 83% (95% CI 70-96) and 86% (95% CI 74-98), respectively. The log-rank test demonstrated no significant difference in survival distributions between revision and primary OCA for reoperation (p = .568) and failure (p = .753).

Variable	Primary OCA, n (%)	Revision OCA, n (%)	P-value ¹
Sex			0.227
Female	11 (37%)	11 (73%)	
Male	19 (63%)	4 (27%)	
Age (years)			0.516
Mean ± SD	28.7 ± 8.0	31.4 ± 10.8	
BMI			0.336
Mean ± SD	26.17 ± 3.24	25.90 ± 3.42	
Laterality			0.628
Left	14 (47%)	2 (13%)	
Right	16 (53%)	13 (87%)	
Standing gait			<0.001
Current	1 (3.3%)	1 (6.7%)	
Former	1 (3.3%)	8 (53%)	
WC	24 (77%)	14 (93%)	<0.001
Pain reoperation			<0.001
Mean ± SD	2.80 ± 1.48	3.80 ± 1.39	
Stagnation duration (days)			0.001
Mean ± SD	3.6 ± 4.4	5.3 ± 5.8	
Defect width (mm)			0.517
Mean ± SD	20.18 ± 2.57	20.10 ± 2.58	
MRI			0.180
MRB	4 (13%)	7 (47%)	
LFC	22 (73%)	8 (53%)	
Major Compartment Surgery			<0.001
LMEs	18 (57%)	5 (33%)	
MMEs	4 (13%)	3 (20%)	

Variable	Primary	Revision	p-value ²
Baseline scores			
IKDC	41.4 ± 17.7	41.3 ± 15.0	0.421
Lysholm	47.8 ± 17.9	45.0 ± 17.2	0.114
KOOS subscales			
Pain	60.2 ± 16.7	55.8 ± 17.3	0.151
Symptoms	50.7 ± 14.1	57.4 ± 19.8	0.748
Sport	33.8 ± 20.8	33.4 ± 23.6	0.908
ADL	66.3 ± 15.3	71.4 ± 21.5	0.476
QOL	21.1 ± 19.2	38.4 ± 19.3	0.494
5-year minimum scores			
IKDC	75.7 ± 16.1	72.4 ± 15.5	0.552
Lysholm	81 ± 7.4	78.4 ± 7.8	0.229
KOOS subscales			

Characteristic	Primary	Revision	P-value ³
Subjective IKDC	7 / 9 (78%)	7 / 10 (70%)	<0.001
Lysholm	8 / 9 (89%)	5 / 8 (63%)	0.429
Pain	7 / 9 (78%)	10 / 10 (100%)	0.211
Symptoms	5 / 9 (56%)	7 / 10 (70%)	0.630
Sport	7 / 9 (78%)	9 / 10 (90%)	0.352
ADL	7 / 9 (78%)	8 / 10 (80%)	0.870
QOL	9 / 9 (100%)	8 / 10 (80%)	0.582

ADL, activities of daily living; IKDC, International Knee Documentation Committee; KOOS, Knee Injury and Osteoarthritis Outcome Score; PASS, patient acceptable symptomatic state; QOL, quality of life.