Clinical Outcomes of Multiple Osteochondral Allograft Transplantation of the Knee: An Analysis of Snowman Technique and Multifocal Lesions

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Objectives: To report the clinical outcomes of snowman technique osteochondral allograft transplantation (OCA) and clinical outcomes of multifocal OCA.

Methods: Consecutive patients who underwent either a primary snowman OCA or multifocal (i.e. bipolar patellofemoral, patellofemoral and a condyle or bicondylar) with a minimum 2-year follow-up by a single surgeon from 4/2003 to 4/2015 were isolated. Failure was defined as revision OCA, conversion to arthroplasty, or gross appearance of graft degeneration on 2nd look arthroscopy.

Results: Twenty-six patients (28 knees) were isolated with 22 patients (24 knees; 85.7%) having 2-year clinical follow-up. Nine of 11 patients (81.8%) who underwent isolated condylar snowman allografts met inclusion criteria at mean follow-up of 7.4±3.6 years, while 13 additional patients (15 knees; 88.2%) underwent multifocal OCA at mean follow-up of 6.4±3.9 years. All 9 patients who received isolated snowman OCA were to the medial femoral condyle. Reoperations were common with 44.4% (N=4) of the snowman group and 20% of multifocal OCA (N=3) undergoing at least 1 reoperation. There were 3 failures (33.3%) in the snowman technique group at a mean 7.7±5.5 years and 1 failure in the multifocal OCA group at 4.5 years. All 4 failures underwent TKA. Patients who underwent multifocal OCA demonstrated significant improvements in the International Knee Documentation Committee score, Knee Injury and Osteoarthritis subscores, Western Ontario and McMaster Universities Osteoarthritis Index subscores, and the Short-Form-12 physical component (P <0.05 for all). Patients who underwent snowman OCA demonstrated significant improvement in KOOS pain subscore and WOMAC overall scores (P<0.05 for both) **Table 1**].

Conclusion: While in a small cohort, patients who underwent snowman OCA had a high rate of reoperation (44.4%) and a high rate of failure (33.3%). Comparatively, patients who underwent multifocal OCA had reoperation and graft survival rates comparable to published literature for focal OCA.

Table 1: Patient-reported clinical outcome measures for both snowman technique osteochondral allografts and multifocal grafts

Multifocal Osteochondral Allograft Transplantation					
	Preoperative		Postoperative		P Value
	Mean	SD	Mean	SD	
Marx	1.67	1.60	6.13	3.57	0.285
Lysholm	41.83	9.31	55.00	13.62	0.237
IKDC	32.71	5.02	52.92	12.55	0.010
KOOS-Pain	51.48	9.59	65.28	10.57	0.155
KOOS - Symptom	56.25	9.99	66.07	9.47	0.025
KOOS - ADL	58.70	9.47	77.21	10.18	0.026
KOOS - Sport	18.33	9.19	40.36	14.66	0.026
KOOS - QOL	11.98	5.41	41.07	16.16	0.005
WOMAC - Pain	8.82	1.81	6.07	1.81	0.212
WOMAC - Stiffness	4.00	0.89	2.93	0.89	0.046
WOMAC - Function	28.18	5.20	15.36	6.79	0.037
WOMAC - Overall	37.55	8.73	15.93	7.96	0.047
SF-12 Physical	33.62	4.07	44.65	5.25	0.011
SF-12 Mental	53.14	5.10	55.11	3.37	0.859
Snowman Technique Osteochondral Allograft Transplantation					
Marx	0.00	0.00	2.33	0.76	N/A
Lysholm	37.17	3.83	66.17	14.75	0.138
IKDC	29.34	2.54	54.14	13.29	0.285
KOOS-Pain	44.91	5.51	72.62	9.77	0.043
KOOS - Symptom	46.43	5.30	66.33	11.24	0.080
KOOS - ADL	56.86	13.25	82.35	11.09	0.345
KOOS - Sport	17.50	3.06	53.57	19.35	0.223
KOOS - QOL	19.79	7.24	49.11	14.71	0.104
WOMAC - Pain	9.17	1.93	6.00	2.47	0.109
WOMAC - Stiffness	4.83	0.86	2.71	0.75	0.068
WOMAC - Function	29.50	9.08	12.00	7.43	0.345
WOMAC -Overall	45.17	10.45	10.71	6.18	0.043
SF-12 Physical	45.01	3.03	41.45	5.40	0.686
SF-12 Mental	52.61	5.13	55.71	7.48	0.500