The Influence of Donor Demographics on Outcomes following Knee Osteochondral Allograft Transplantation

Mario Hevesi, Kyle R Wagner, Ryan Quigley, Zachary D Meeker, Landon Patterson Frazier, Adam Blair Yanke¹, Brian J Cole²

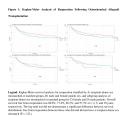
¹Rush University Med Ctr, ²Rush University Medical Center INTRODUCTION:

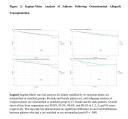
Osteochondral allograft transplantation (OCA) effectively treats focal osteochondral defects, improving clinical status with high success rates. However, patient-specific risk factors such as body mass index, age, smoking, and workers' compensation status can impact survivorship rates. Although OCA has been considered immunoprivileged due to its avascular and aneural nature, recent studies have shown lower survival rates when there is a donor-recipient sex mismatch. This study aims to assess the impact of donor sex and age, donor-recipient sex mismatch, and graft storage duration on clinical outcomes and failure rates in knee OCA transplantation.

METHODS: Patients undergoing knee OCA transplantation from 2003-2018 were prospectively followed. Inclusion criteria consisted of primary OCA transplantation and minimum 2-year follow up. Patient demographic data and allograft donor sex, age, and graft storage time prior to implantation were collected. Patients were evaluated for failure, defined as 1) removal or revision of the primary OCA or 2) conversion to arthroplasty. A Kaplan-Meier curve determined cumulative survivability of OCA transplantations and log-rank testing was used to compare survivorship between groups. Stepwise regression analysis was utilized to evaluate associations between donor variables and achievement of clinically significant outcomes (CSOs), reoperation, and failure.

RESULTS: A total of 360 patients undergoing OCA transplantation met inclusion criteria and were followed for a mean of 5.5 ± 2.6 years (range: 2.0 - 16.3) postoperatively. Among them, 211 patients had a sex-matched OCA donor, while 149 recipients had a sex mismatch with their donor (Table 1). A mismatch in donor and recipient sex was present for significantly more female patients (90%) than male patients (10%, P < .001). Patients in the sex-mismatch cohort demonstrated smaller defect size (P = .002), younger donor age (P = .023), and more frequently underwent concomitant tibial tubercle osteotomy (P = .031) compared to sex-matched patients. No donor variables predicted CSOs for International Knee Documentation Committee subjective score as well as Knee injury and Osteoarthritis Outcome Score subscales. Log-rank testing found no significant difference in survival free from reoperation or failure based on donor-recipient sex mismatch (p \geq .385). On Cox regression analysis, no donor variables were associated with failure, although storage time \geq 25 days trended toward significance (P = .065).

DISCUSSION AND CONCLUSION: In contrast to previous historic data, no substantial survival difference was observed for sex-mismatched OCA donors and recipients in terms of reoperation or failure. These data can help inform graft selection, expedient recipient selection, and outcome optimization following OCA transplantation.





Characteristic	Non-mismatch, N = 211:	Mismatch, N = 149	Prestue
Sex			+0.001
Ferrole	58 (27%)	134 (90%)	
Male	153 (72%)	15 (10%)	
Age (years)	21.0 ± 9.7	31.6 ± 10.0	0.969
Mean a 50			
BMI	27.1 ± 4.4	25.9 ± 4.2	0.007
Mean x 50			
Laterality			0.481
Left	87 (41%)	67 (45%)	
ASSAT	124 (59%)	82 (55%)	
Smoking status			0.861
Current	14 (6.6%)	12 (8.190)	
Former	8 (3.8%)	5 (3.4%)	
Never	189 (50%)	132 (89%)	
Prior surgeries	2.62 s 1.56	2.09 ± 1.40	0.373
wc	29 (1490)	17 (11%)	0.513
	Detect is	cation	
MFC	112 (53%)	73 (49%)	0.445
LFC	91 (43%)	62 (42%)	0.016
Trochlea	25 (1290)	13 (8.710)	0.342
Patella	23 (11%)	24 (16%)	0.149
	Defect diam	reter (mm)	
MFC	19.8 a 5.1	18.3 x 3.8	0.015
LFC	19.7 ± 3.6	18.1 ± 3.2	0.003
Trochles	10.9 ± 4.5	18.9 a 3.6	0.845
Patella	17.7 ± 3.2	19.8 ± 4.0	0.084
mismatch in the allografi d medial fersoral condute: W	orative nariables of potients incl timor and recipient's sex. SMI, to C, worker's compression status as n. Okic continuous variables a	ndy mess index; EFC, lateral fo	whether there was a moral candyle, MPI

Variable	Non-Mismatch:	Mismatch:	P-value
Major concomitant procedure	119 (56%)	80 (54%)	6619
Ligament repair or reconstruction	14 (5.0%)	5 (3.4%)	6.179*
UMAT	54 (00%)	37 (29%)	6.679"
HEMAT	40 (1994)	28 (323)	6.1125
HTO DED	21 (10.0%)	8 (5.400 5 (5.400	0.116° 0.400°
AMIZ	11(52%)	17 (119)	0.001"
MES	16 (7.6%)	9.6600	6500
ACI	0.0%	2 (1.8%)	8107
MAC	29 (9.5%)	22 (19%)	8.124"
197	4(1.2%)	3 (2.0%)	1-0.3997
Donor sos	216 + 63	22.0 x 5.9	0.023*
Days in storage	26.5 ± 2.6	241 x 2.6	0.607
Subsequent reoperation	73 (89%)	55 (37%)	0.6657
Failure	25 (12%)	78 (18%)	6.790
Follow-up (years)	540 x 2.9	5.63 ± 2.5	6.152*
Surgical variables and di allograft donor and reci- listed procedures, apart planna (PRP), ACI, auto- reconstruction; AMZ, an osteotomy, HTO, high to stimulation; MWAT, me	pient's sex. A major con- from bone mirrow aspi- opous chandrocate i mol- teromedialization with a bial osteotomy, UMAT, li-	comitant procedure is di vite concentrate (BMAC antation: ACUIt, anterior fibial tuberole osteotor steral meniscal transplar	efined as any of the) or pletelet-rich - cruciate figament ric DFO, clotal femons