Multivariable Analysis of Clinical Outcome following Osteochondral Allograft Transplantation

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INTRODUCTION:

Osteochondral allograft (OCA) transplantation is an effective treatment for articular cartilage lesions in the knee. Many patient- and technique-related factors have been shown to affect graft survivorship. The purpose of this study was to define the magnitude of effect of different variables on outcome of OCA transplantation using a multivariable model.

METHODS:

A total of 527 patients (560 knees) who underwent OCA transplantation from 1997 to 2021 were identified using a prospective institutional registry with mean 8.2 year postoperative follow up. Mean age of patients was 32.6 years old and 62% were male. Failure was defined as removal of graft or conversion to arthroplasty. Univariate analysis was first used to identify variables associated with treatment failure (Table 1) and included in a logistic regression model.

RESULTS:

Graft failure occurred in 89 knees (15.9%) at a median of 3.9 years postoperatively (62 arthroplasties, 25 revision allografts, 1 patellectomy). Graft survivorship was 89% at 5 years, 83% at 10 years, and 75% at 15 years. Patient age, diagnosis, and graft size independently predicted a higher risk of failure after controlling for other variables (Table 2). Patients ≥30 years old were 2.2 times more likely than younger patients to have graft failure. Patients with degenerative chondral lesions, avascular necrosis, or osteoarthritis were more likely than patients with osteochondritis dissecans to have allograft failure. Treatment area of >8 cm^2 were 2.2 times more likely to fail than ≤8 cm^2. BMI, anatomic location, number of previous surgeries, and number of allografts were associated with failure in univariate analyses, but not in the multivariable analysis.

DISCUSSION AND CONCLUSION:

Older age, degenerative diagnosis, and larger graft size were associated with higher risk of treatment failure after controlling for other variables. This data may help guide surgeons in counseling individual patients on their prognosis following OCA transplantation.

Table 1. Univariate analyses

Variable	Non-failure	Failure	p-value
	Treatment status		
Sex			0.636
Male	85%	15%	
Female	83%	17%	
Age (years)	31.6 ± 11.7	37.5 ± 12.0	<0.001
Body mass index	25.3 ± 4.6	27.4 ± 5.4	0.002
Diagnosis			<0.001
Osteochondritis dissecans	92%	8%	
Traumatic chondral injury	94%	6%	
Degenerative chondral lesion	79%	21%	
Fracture	80%	20%	
Avascular necrosis	77%	23%	
Osteoarthritis	64%	36%	
Anatomic location			<0.001
Medial femoral condyle	88%	12%	
Lateral femoral condyle	91%	9%	
Trochlea	87%	13%	
Patella	79%	21%	
Medial tibial plateau	50%	50%	
Lateral tibial plateau	87%	13%	
Two or more locations	72%	28%	
Number of previous surgeries			<0.001
≤ Two	87%	13%	
> Two	76%	24%	
Number of grafts			0.009
One	87%	13%	
≥ Two	79%	21%	
Total graft size (cm^2)	8.2 ± 5.6	12.6 ± 9.3	<0.001

Data presented as % or mean ± standard deviation

Table 2. Logistic regression analysis for variables predicting treatment failure

Predictor	Reference group	Odds ratio in comparison to reference group	p-value
Age			
>30 years	≤30 years	**2.20**	**0.008**
Diagnosis			
Traumatic chondral injury	Osteochondritis dissecans	0.61	0.412
Degenerative chondral lesion	Osteochondritis dissecans	**2.06**	**0.042**
Fracture	Osteochondritis dissecans	1.66	0.317
Avascular necrosis	Osteochondritis dissecans	**2.72**	**0.028**
Osteoarthritis	Osteochondritis dissecans	**3.25**	**0.005**
Total graft size			
>8 cm^2	≤8 cm^2	**2.19**	**0.005**

Significant findings (p<0.05) are shown in bold