Use of BTB Autograft for Revision ACL Reconstruction Results in Lowest Risk of Failure

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INTRODUCTION: The primary purpose of this study was to assess failure rates in revision ACL reconstruction and to determine the influence of age, graft selection, and lateral augmentation procedures. A secondary purpose was to determine patient-reported outcomes following revision reconstruction at intermediate-term follow-up.

METHODS: This was a retrospective study at a tertiary academic medical center. The electronic medical record was queried for current procedural terminology (CPT) codes for ACL reconstructions (29888) from June 2011 – October 2022. Patients with concomitant osteotomy were excluded. Demographic information including age, gender, and BMI was obtained from the EMR query. Graft types and lateral augmentation procedures were identified through manual review of operative notes. Failure rates were recorded based on documentation of ACL graft failure in clinic notes or by patient report on phone follow-up. Patient-reported outcomes including return to sport, VAS pain scores, and KOOS-Jr scores were obtained for patients reached for phone follow-up.

RESULTS: One-hundred sixty patients who underwent revision ACL reconstruction at our institution were included. Median follow-up was 4.4 years (range 2.0-11.9 years). Overall failure rate at final follow-up was 18.1%. The rate of failure differed based on graft selection (p=.022), with the lowest failure rates in BTB autograft reconstruction (5.7%). Regression analysis controlling for age, length of follow-up, and lateral augmentation procedures identified BTB autograft reconstruction to be a significant independent predictor of failure, with 0.19 lower odds of failure (95% CI 0.051-0.67) compared to other graft choices (p=.010). Although it was not statistically significant (p=0.132), concomitant LET at time of revision ACL was shown to have a lower rate of failure (9.1%) when compared to ALL reconstruction (25%) and no lateral augmentation (28.6%). Patient-reported outcomes at final follow-up were not different based on graft choice.

DISCUSSION AND CONCLUSION:

Even when controlling for age and lateral augmentation procedures, BTB autograft reconstruction was protective against failure at a median 4.4-year follow-up after revision ACL reconstruction. Careful consideration of patient characteristics and postoperative goals is necessary in determining graft choice and lateral augmentation procedures. If available, strong consideration should be given for using BPTB autograft for revision ACL reconstruction.

Figure 1. Graft Selection in Entire Cohort vs. Patients >40 Years of Age

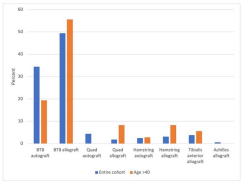

Figure 2. Adjusted Odds Ratios for Revision ACL Failure

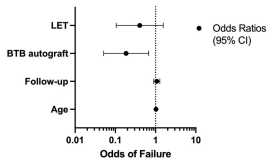

Table 1. Characteristics of Patients with Failure vs. No Failure after Revision ACLR

	Failure (n = 29)	No Failure (n = 128)	p-value
Sex			.869
Male	19 (18.1%)	86 (81.9%)	
Female	10 (19.2%)	42 (80.8%)	
Age[a]	33.8 [28.4, 45.3]	30.4 [25.0, 37.6]	**.046**
BMI[a]	25.5 [23.8, 28.5]	25.5 [23.1, 28.3]	.718
Graft			**.022**
BTB Autograft	3 (5.7%)	50 (94.3%)	
Soft tissue Autograft	3 (27.3%)	8 (72.7%)	
BTB Allograft	18 (23.1%)	60 (76.9%)	
Soft tissue Allograft	5 (33.3%)	10 (66.7%)	
Lateral augmentation[b]			.132
None	8 (28.6%)	20 (71.4%)	
ALL	4 (25.0%)	12 (75.0%)	
LET	3 (9.1%)	30 (90.9%)	
Prior revision			.133
Yes	7 (31.8%)	15 (68.2%)	
No	22 (16.3%)	113 (83.7%)	

[a]Continuous variables reported as median [IQR]
[b]Calculated for patients who had surgery in 2018 or later

Table 2. Patient-Reported Outcomes after Revision ACL Reconstruction

	BTB Autograft (n=26)	Other Graft (n=50)	p-value
VAS pain score[a]	5.0 [0, 17.5]	10.0 [0, 30.0]	.438
KOOS-JR score[a]	84.6 [79.9, 100.0]	84.6 [73.3, 100.0]	.363
Return to Sport[b]			
Any level	14 (58.3%)	23 (62.2%)	.594
Same level	7 (29.2%)	10 (28.6%)	.788

[a]Continuous variables reported as median [IQR]
[b]Calculated for the fifty-nine patients who reported they had played a sport prior to ACLR