

## **Primary Anterolateral Ligament Rupture in Patients Requiring Revision Anterior Cruciate Ligament Reconstruction: A Retrospective Magnetic Resonance Imaging Review**

Carr JB, Yildirim B, Richter DL, Etier BE, Diduch DR, Anderson MW, Pierce J  
Division of Sports Medicine, Department of Orthopaedics, University of Virginia,  
Charlottesville, VA, USA

**Background:** After anterior cruciate ligament reconstruction (ACLR), only 60% of patients are able to return to their pre-injury level of sports with nearly 15% experiencing persistent rotatory instability. Young patients returning to pivoting sports experience high rates of graft tear and subsequent need for revision ACLR. Recently, the anterolateral ligament (ALL) has gained attention as an important rotatory stabilizer about the knee in prevention of the pivot shift phenomenon. It is theorized that an ALL tear at initial injury may predispose a patient to failure of primary ACLR due to persistent rotatory instability from a torn ALL. The purpose of this study was to investigate the incidence of primary ALL rupture on magnetic resonance imaging (MRI) in a population that required revision ACLR compared to a matched cohort of patients after primary ACLR with an intact graft.

**Methods:** Using CPT and ICD-9 and 10 codes, a retrospective search was performed within our electronic medical record database for patients who had ACLR and revision ACLR. Patients were excluded for a chronic ACL injury greater than 6 months, MRI obtained more than 3 months after initial injury, inability to obtain initial injury MRI, or presence of a multiligament knee injury. Age, sex, and graft type were recorded for every revision ACLR patient, and each revision patient was paired with a matched control that did not require revision ACLR. Two clinically blinded, fellowship trained musculoskeletal radiologists reviewed initial injury MRI scans to diagnose an ALL injury. Each MRI was given a diagnosis of either an intact ALL, a partially torn ALL, or a completely torn ALL. The incidence of primary ALL rupture between the revision ACLR group and control ACLR group was evaluated for statistical difference using the Pearson Chi Square test.

**Results:** 1967 patients underwent ACLR at our institution between 2009-2015, and 128 patients required revision ACLR. Initial injury knee MRI was available for 55 revision ACLR patients, and 39 of these patients met inclusion criteria. For the revision cohort, the average age at primary ACLR was 21.1 years (range 13-47 years). Time between primary and revision ACLR was an average of 2.2 years (0.23-8.72 years) (Table 1). In the ACLR control cohort, the average age of ACLR was 20.9 years (range 13-47). Average length of follow-up was 0.6 years (0.21-2.8 years). The revision cohort had 17 patients with an intact ALL, 14 patients with a partial ALL tear, and 8 patients with a complete ALL tear on initial injury MRI. The control cohort had 18 patients with an intact ALL, 13 patients with a partial ALL tear, and 8 patients with a complete ALL tear. There was no statistically significant difference between the two cohorts in amount of primary ALL ruptures (Pearson Chi-Square=0.066, p-value=0.968) (Table 2).

**Conclusions:** The incidence of primary ALL rupture in patients undergoing revision ACLR was similar to an age and graft matched control cohort that did not require revision ACLR. These findings suggest that a primary ALL tear may not be a risk factor for subsequent ACL graft failure. It is unknown if this could be explained by an ability of the ALL to heal without intervention or if other risk factors are more important in predicting revision ACLR. Further research is needed to better understand the role of the ALL in both primary and revision ACLR.

Table 1. Demographic data of revision and control ACLR cohorts

	<b>Revision Cohort</b>	<b>Control Cohort</b>
Total patients	39	39
Gender (M:F)	17:22	17:22
Age at 1° ACLR, Mean (Range)	21.1 yrs (13-47)	20.9 yrs (13-47)
1° Graft Type, n (%)		
HS Autograft	25 (64.1%)	26 (66.7%)
BPTB Autograft	13 (33.3%)	13 (33.3%)
HS Autograft +Allograft	1 (2.6%)	0 (0%)
Time to Revision, Mean (Range)	2.2 yrs (0.23-8.1)	N/A

ACLR=anterior cruciate ligament reconstruction, HS=hamstring, BPTB=bone patellar tendon bone

Table 2. Comparison of anterolateral ligament (ALL) diagnosis between revision and control ACLR cohorts

<b>ALL Diagnosis</b>	<b>Revision Cohort</b>	<b>Control Cohort</b>	<b>Total</b>
Intact	17	18	35
Partially Torn	14	13	27
Completely Torn	8	8	16
Total	39	39	78
		Pearson Chi Square = 0.066	
		p-value = 0.968	