Long-term Relative Risk of Arthroplasty Following ACL Reconstruction in a Cohort of 116,672 Patients with a History of ACL Reconstruction in Only One Knee: Comparing the Index Knee to the Contralateral Knee in an Analysis of the National Hospital Episode Statistics for England, UK

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INTRODUCTION:

ACL injury is common and is frequently associated with chondral damage at the time of the injury. Patients often ask about their long-term prognosis in terms of needing a subsequent knee arthroplasty. Past studies have attempted to answer this question by comparing the risk to the general population without a record of ACL surgery. The aim of this study was to determine a more patient and population-specific relative risk of arthroplasty, by comparing the rate of arthroplasty in the operated knee to the opposite knee of the same patients, in a cohort with a history of ACL reconstruction on only one side.

METHODS:

The national Hospital Episode Statistics (HES) database for England, UK, was interrogated to identify all patients undergoing ACL reconstruction surgery (ACLr) between 1997/1998 and 2022/2023. Records were cleaned to identify patients undergoing their first ACL reconstruction to the index knee, with no previous or subsequent ACL surgery to their contralateral knee. Records were then analysed to examine arthroplasty free survival of the index native knee which underwent ACLr, versus arthroplasty free survival in the non-intervened knee. The absolute and relative risk of arthroplasty in the index knee versus the contralateral knee was calculated at 10-, 15-, and 20-years after the index knee ACL reconstruction. Mortality-adjusted Kaplan–Meier survival analysis (survival was defined as the native knee not undergoing knee arthroplasty) was also performed.

RESULTS:

A total of 116,672 ACL reconstruction procedures were eligible for analysis. ACL reconstruction was most commonly performed in male patients (75%) and most frequently in the 20-29-years age group (44%). At 10 years post ACLr, there was an ipsilateral arthroplasty rate of 0.66% (95% CI 0.59-0.75%) versus a contralateral rate of 0.22% (95% CI 0.17-0.26). This corresponded to a 10-year relative risk (RR) of arthroplasty of 3.2 (95% CI 2.43-3.77). At 15 years post ACLr, the rate of arthroplasty on the reconstructed side was 1.6% (95% CI 1.41-1.81), versus the contralateral rate of 0.53% (95% CI 0.42-0.65). This corresponds to a 15-year RR of 3.05 (95% CI 2.39 - 3.90). At 20 years post ACLr, the rate of ipsilateral arthroplasty was 4.05% (95% CI 3.4. 4.7%) versus the contralateral rate of 1.25% (95% CI 0.92-1.65%). This corresponded to a RR at 20-years of 3.22 (95% CI 2.34-4.44). These findings are summarized with further breakdown by age group and sex in Table 1. Long-term native knee survivorship is shown in the Kaplan-Meier plot (Figure 1).

DISCUSSION AND CONCLUSION:

To our knowledge this is the first study to estimate the population-specific relative risk of knee arthroplasty following an ACL injury and reconstruction by using the contralateral knees of the same patients as the control. The relative risk is approximately three-times that of the unoperated knee at 20-years, and this is important information that can be shared to better inform patients discussing their long-term prognosis in the clinic.

FIGURE 1
Index knee (ACL reconstruction) vs. Contralateral knee (no ACLr) survival of native knee (not undergoing subsequent knee arthroplasty)

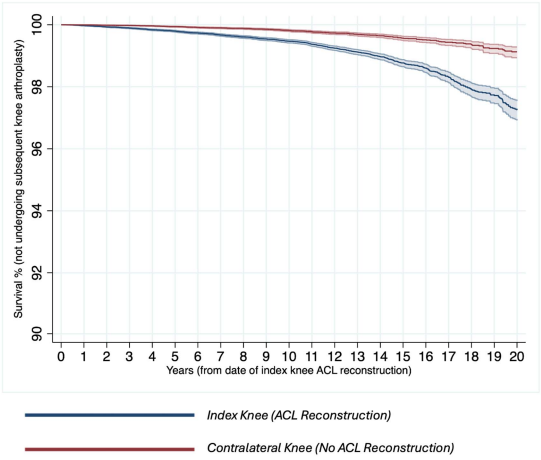

TABLE 1
The relative risk (RR) of undergoing arthroplasty (TKA or UKA) in the knee which underwent ACL reconstruction versus the contralateral knee

	10 years		*15 years*		*20 years*	
	RR	95% CI	RR	95% CI	RR	95% CI
Overall	3.2	(2.43-3.77)	3.05	(2.39-3.9)	3.22	(2.34-4.44)
Sex						
male	3.03	(2.26-4.07)	3.1	(2.29-4.2)	3	(2.09-4.29)
female	1.9	(1.33-2.71)	2.96	(1.96-4.47)	4.22	(2.05-8.65)
age group						
age 20-29	3	(1.56-5.76)	2.8	(1.36-5.75)	5	(1.91-13.03)
age 30-39	3.3	(2.13-5.12)	4.7	(2.9-7.6)	3.85	(2.36-6.26)
age 40-49	3.38	(2.37-4.82)	2.64	(1.82-3.8)	2.53	(1.42-4.52)
age 50-59	2.22	(1.42-3.47)	2.23	(1.28-3.87)	1.75	(0.78-3.9)