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# Precollegiate Knee Surgery Predicts Subsequent Injury Requiring Surgery in NCAA Athletes

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**Background:** The effect of precollegiate orthopaedic surgery on injury risk in the elite collegiate athlete is unknown.

**Purpose:** To (1) assess the relationship between precollegiate surgery and subsequent injury requiring surgery in National Collegiate Athletic Association (NCAA) Division I athletes at a single institution and (2) compare the risk of subsequent surgery in the ipsilateral versus contralateral extremity in those with a history of precollegiate surgery.

**Study Design:** Cohort study; Level of evidence, 3.

**Methods:** A retrospective chart review was performed of all athletes who began participation from 2003 to 2009 until completion of eligibility. Athletes who received orthopaedic surgery in college were identified through the Sports Injury Monitoring System and were cross-referenced with medical records. The risk of orthopaedic surgery was evaluated using multivariate Cox and Poisson regression models, with sex and sport as additional covariates. Risk of subsequent surgery in the ipsilateral versus contralateral extremity was compared using Kaplan-Meier survival estimates and Cox proportional hazards regression. Hazard ratios (HRs) and rate ratios (RRs) with corresponding 95% confidence intervals were used to compare groups.

**Results:** In total, 1141 athletes were identified for analysis. Of these, 186 athletes (16.3%) had a history of precollegiate orthopaedic surgery. There were 261 documented intracollegiate orthopaedic surgeries in 181 athletes (15.9%). Precollegiate knee surgery was an independent predictor of orthopaedic surgery (HR, 1.85; 95% CI, 1.16-2.83) in college. When examining only surgeries resulting from acute or primary injuries, precollegiate knee surgery was an independent predictor of primary knee injury requiring surgery in college (HR, 4.45; 95% CI, 2.51-7.59). Athletes with a history of precollegiate surgery were more susceptible to subsequent surgery in their ipsilateral extremity compared with their other extremities (HR, 1.89; 95% CI, 1.03-3.53). In contrast, there was no additional risk of receiving subsequent surgery in the contralateral extremity ( $P = .54$ ).

**Conclusion:** Precollegiate knee surgery in the Division I athlete is associated with subsequent injury requiring surgery in college. Athletes with a history of precollegiate surgery are at higher risk of subsequent surgery in their ipsilateral extremity compared with other extremities.

**Keywords:** athlete; injury; college; surgery; laterality

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Over the past 15 years, there has been an increase in youth participation in organized athletics in the United States.<sup>18</sup> Young athletes face pressure to excel and frequently participate in multiple leagues. Single-sport specialization is also occurring at younger ages.<sup>9,27</sup> As a result, sports-related injury requiring surgery in the young athlete has increased in recent years.<sup>24,25</sup> Within this population, collegiate athletes represent a unique subset in which everyone is of relatively uniform age, participates at an elite level of competition, and has finite career lengths as determined by National Collegiate Athletic Association (NCAA) eligibility. For aspiring collegiate athletes, injuries sustained before or during high school may have a significant effect on their ability to stay healthy during their collegiate careers.

The existing literature on risk factors for injury in collegiate athletes has focused primarily on sex and type of

sport. Disparities in injury rates by sex are thought to be related to differences in biomechanics, joint laxity, muscle strength, and hormone levels.<sup>11,28</sup> The higher rate of anterior cruciate ligament (ACL) tears in female versus male athletes is well established in a variety of sex-matched sports.<sup>1-3,23</sup> In addition, female collegiate athletes are more prone to overuse injuries than males.<sup>15,27,32</sup> Among sport types, injury rates vary widely due to sport-specific maneuvers and variable levels of contact. In collegiate athletes, the highest cumulative injury rates are in football, gymnastics, and soccer,<sup>13</sup> and the highest ACL injury rates are in basketball, soccer, and lacrosse.<sup>19,23</sup>

However, very few studies have factored in surgical history as a potential risk factor for injury leading to further surgery in the collegiate athlete. There is evidence to suggest that collegiate athletes with a history of precollegiate knee surgery are more susceptible to knee injury and surgery in college.<sup>29</sup> In a study of collegiate athletes who underwent ACL reconstruction, reoperation was higher in those who had precollegiate reconstruction compared with those who had intracollegiate reconstruction.<sup>14</sup> Moreover, those who had precollegiate reconstruction had a higher rate of contralateral ACL injury.<sup>14</sup> Sustaining an injury requiring orthopaedic surgery in college is associated with significant cost and can have a profound effect on an athlete's playing career.

The purpose of the present study was to (1) assess the relationship between precollegiate surgery and subsequent injury requiring surgery in NCAA athletes, while controlling for sex and sport as potential confounders, and (2) compare the risk of subsequent surgery in the ipsilateral versus contralateral upper or lower extremity in those with a history of precollegiate surgery. The study was completed at a large NCAA Division I institution with 20 varsity sports.

## METHODS

A retrospective chart review was performed of all NCAA Division I collegiate athletes at the University of California at Los Angeles who began participation from 2003 to 2009 until the completion of their student-athlete eligibility. This included athletes from 20 different sports—baseball, men's and women's basketball, cross country, football, men's and women's golf, gymnastics, rowing, men's and women's soccer, softball, swimming and diving, men's and women's tennis, track and field (which included men and women), men's and women's volleyball, and men's and women's water polo. Sex-specific sports included baseball (men), football (men), gymnastics (women), rowing (women), softball (women), and swimming and diving (women). Dual-sport athletes were classified to the sport in which they participated the most. The number of seasons in which an athlete was an active participant in practice, games, or offseason training program was obtained from the institution's sports archives. This included any red-shirt seasons in which an athlete was an active participant. All athletes received a preparticipation physical evaluation (PPE) by a licensed physician before participating in collegiate athletics. Data on sex and any precollegiate orthopaedic surgery were elicited through the PPEs. Operative reports for

precollegiate orthopaedic surgeries were not available, so details of these surgeries were gathered from the PPE history and examination. Athletes who sustained an acute or overuse injury requiring orthopaedic surgery in college were identified through the Sports Injury Monitoring System (FlanTech Inc) and were cross-referenced with medical records. Institutional review board approval from the University of California at Los Angeles was obtained for this study.

In total, 1170 athletes were identified. Due to missing PPEs, 29 athletes were excluded, leaving 1141 athletes (584 males and 557 females) for analysis (Table 1). To improve statistical power while maintaining the maximum number of degrees of freedom, several sports were grouped into a single level: softball with baseball, water polo with swimming and diving, and cross country with track and field. These sports are similar in nature and have comparable injury types.<sup>7,17,26</sup> Golf was chosen as the reference sport because its athletes had the lowest percentage of orthopaedic surgery in college. Precollegiate orthopaedic surgery was stratified into shoulder, elbow, wrist/hand, knee, and foot/ankle surgery, and each group was first univariately analyzed as separate predictor variables. Those independently associated ( $P \leq .05$ ) with intracollegiate surgery were then entered into the multivariate Cox proportional hazards regression model with sex and sport. A post hoc analysis to examine only primary injuries requiring surgery was completed by excluding secondary surgeries (ie, hardware removals, revision surgery for chronic symptoms). In addition, orthopaedic surgery in college was further stratified into upper extremity, lower extremity, and knee surgery. Exposure time was calculated from the date of PPE to the date of surgery (event) or to the end of the collegiate athletic career (censored). Similarly, a univariate followed by multivariate Poisson regression, a regression of counts, was used to assess predictors of the number of intracollegiate surgeries per seasons played. In athletes with a history of precollegiate orthopaedic surgery, the risk for subsequent surgery in the same versus contralateral extremity was indirectly compared using both Kaplan-Meier survival estimates and Cox proportional hazards regression. Hazard ratios (HRs) and rate ratios (RRs) with corresponding 95% confidence intervals were calculated for proportional hazards and Poisson regression analyses, respectively. The chi-square test was used to examine the association between categorical variables. All analyses were performed with JMP Pro 10 (SAS Institute).

## RESULTS

The mean ( $\pm$  SD) number of active seasons was  $3.0 \pm 1.4$  (Table 1). Before their PPE, 186 athletes (16.3%) had been treated with at least 1 orthopaedic surgery. Of these, 76 athletes (6.7%) had been treated with surgery in the upper extremity involving the shoulder ( $n = 20$ ), elbow ( $n = 30$ ), and wrist or hand ( $n = 32$ ), and 119 athletes (10.4%) had been treated with surgery in the lower extremity involving the hip ( $n = 1$ ), knee ( $n = 88$ ), and foot or ankle ( $n = 25$ ). Football players had the highest percentage of precollegiate upper extremity surgery (12.6%), and gymnasts had the highest percentage of precollegiate lower extremity surgery (42.9%).

TABLE 1  
Summary of Athletes by Sport, 2003-2004 Through 2011-2012 Seasons

Sport	Athletes, n	Sex, Male/ Female, n	Active Seasons, Mean ± SD	Athletes With Prior Surgery, n (%)	
				Upper Extremity Surgery	Lower Extremity Surgery
Baseball/softball	99	67/32	3.0 ± 1.1	11 (11.1)	8 (8.1)
Basketball	56	33/23	2.9 ± 1.3	2 (3.6)	6 (10.7)
Cross country	49	21/28	3.0 ± 1.5	0 (0.0)	3 (6.1)
Football	174	174/—	3.5 ± 1.4	22 (12.6)	18 (10.3)
Golf	35	21/14	3.0 ± 1.2	1 (2.9)	2 (5.7)
Gymnastics	35	—/35	3.0 ± 1.4	4 (11.4)	15 (42.9)
Rowing	126	—/126	1.9 ± 1.2	3 (2.4)	7 (5.6)
Soccer	114	54/60	2.9 ± 1.2	7 (6.1)	24 (21.1)
Swimming and diving	56	—/56	3.1 ± 1.2	4 (7.1)	2 (3.6)
Tennis	52	35/17	2.6 ± 1.4	4 (7.7)	3 (5.8)
Track and field	187	97/90	3.0 ± 1.5	6 (3.2)	16 (8.6)
Volleyball	77	42/35	3.0 ± 1.2	6 (7.8)	12 (15.6)
Water polo	81	40/41	3.3 ± 1.4	6 (7.4)	3 (3.7)
Total	1141	584/557	3.0 ± 1.4	76 (6.7)	119 (10.4)

There were 261 documented orthopaedic surgeries in 181 athletes (15.9%) during college. Of the 257 surgeries for which operative reports were available, athletes received surgery in the shoulder (n = 39, 15.2%), elbow or forearm (n = 6, 2.3%), wrist or hand (n = 22, 8.6%), hip (n = 28, 10.9%), knee (n = 107, 41.6%), tibia (n = 10, 3.9%), foot or ankle (n = 38, 14.8%), and lumbar spine (n = 7, 2.7%). The most common surgeries were knee arthroscopies with meniscal repair/debridement and/or chondroplasty/microfracture (26%), ACL reconstructions (13%), and hip arthroscopies with labrum repair/debridement and osteoplasty (11%). Among the 181 athletes who received surgery in college, 127 (69.8%) received surgery as a result of a documented acute injury sustained during games (33%), practices (31%), and off-season training (36%). An additional 57 athletes received surgery as a result of documented failed nonoperative treatment (eg, shoulder instability) or overuse injury (eg, stress fracture), totaling 178 athletes (98.3%) who received surgery in college for acute or primary injuries. There were 63 athletes (34.8%) who had multiple surgeries in college, and there were 13 revision surgeries, 8 of which were revision ACL reconstructions. Figure 1 shows the distribution of surgery types among collegiate athletes.

Using Cox proportional hazards regression, precollegiate shoulder and knee surgery were univariately associated ( $P \leq .05$ ) with orthopaedic surgery in college (Table 2). Precollegiate elbow, hand/wrist, and foot/ankle surgery were not univariately associated with orthopaedic surgery in college and thus not entered into the multivariate model. Both precollegiate shoulder ( $P = .01$ ) and knee ( $P < .01$ ) surgery were associated with sport. In the multivariate Cox regression model, sport and precollegiate knee surgery (HR, 1.85; 95% CI, 1.16-2.83) were independent predictors of orthopaedic surgery in college (Table 3). Athletes in gymnastics, basketball, and volleyball were most likely to receive an orthopaedic surgery in college, while those in golf and

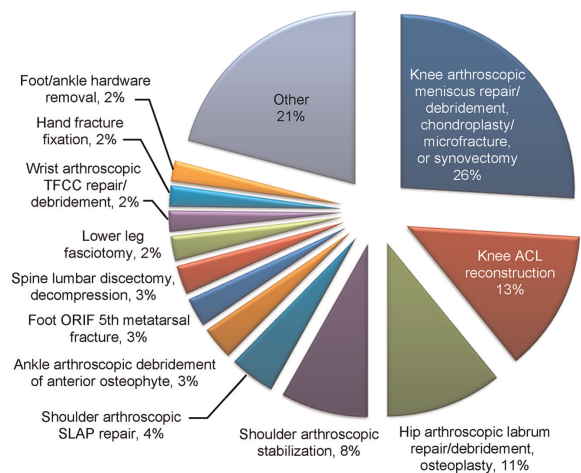


Figure 1. Summary of orthopaedic surgeries in collegiate athletes. ACL, anterior cruciate ligament; ORIF, open reduction and internal fixation; SLAP, superior labrum anterior and posterior; TFCC, triangular fibrocartilaginous complex.

swimming as well as diving/water polo were least likely to receive an orthopaedic surgery in college.

A closer look at primary injuries resulting in surgery revealed that sport and precollegiate knee surgery (HR, 2.77; 95% CI, 1.70-4.35) were significant independent predictors of primary lower extremity injury requiring surgery in college (Table 4). Among these lower extremity surgeries, 74.2% resulted from documented acute injuries. Athletes in gymnastics, basketball, and football were most likely to sustain a primary lower extremity injury requiring surgery in college, while those in golf and rowing were least likely to sustain a primary lower extremity injury requiring surgery in college. There was no association between precollegiate shoulder, elbow, or hand/wrist surgery with primary upper

TABLE 2  
Univariate Cox Proportional Hazards Regression and  
Poisson Regression Analysis for Orthopaedic Surgery in Collegiate Athletes<sup>a</sup>

Predictor Variable	Cox Proportional Hazards		Poisson	
	Hazard Ratio	P Value	Rate Ratio	P Value
Sex <sup>b</sup>	1.24	.15	0.83	<.01
Sport		<.01		<.01
Precollegiate shoulder surgery	2.54	.05	1.18	.17
Precollegiate elbow surgery	1.20	.70	1.04	.70
Precollegiate hand/wrist surgery	0.83	.64	0.93	.42
Precollegiate knee surgery	2.57	<.01	1.54	<.01
Precollegiate foot/ankle surgery	1.77	.17	1.33	<.01

<sup>a</sup>Sex, sport, precollegiate shoulder surgery, and precollegiate knee surgery were entered into the multivariate Cox regression model. Sex, sport, precollegiate knee surgery, and precollegiate foot/ankle surgery were entered into the multivariate Poisson regression model.

<sup>b</sup>Reference = female sex.

TABLE 3  
Multivariate Cox Proportional Hazards Regression and  
Poisson Regression Analysis for Orthopaedic Surgery in Collegiate Athletes<sup>a</sup>

Predictor Variable	Cox Proportional Hazards		Poisson	
	Hazard Ratio (95% CI)	P Value	Rate Ratio (95% CI)	P Value
Sex <sup>b</sup>	1.03 (0.71-1.51)	.87	0.99 (0.90-1.08)	.75
Sport <sup>c</sup>		<.01		<.01
Baseball/softball	4.01 (0.78-73.29)	.11	5.25 (2.16-17.32)	<.01
Basketball	14.88 (3.05-268.02)	<.01	12.95 (5.40-42.43)	<.01
Football	9.97 (2.15-177.10)	<.01	13.89 (5.90-45.04)	<.01
Gymnastics	17.53 (3.48-319.18)	<.01	15.95 (6.53-52.78)	<.01
Rowing	3.53 (0.62-66.44)	.16	2.35 (0.99-8.09)	.09
Swimming and diving/water polo	3.16 (0.62-57.45)	.19	3.33 (1.36-11.04)	<.01
Soccer	8.60 (1.82-153.68)	<.01	8.32 (3.50-27.16)	<.01
Tennis	3.16 (0.47-61.76)	.25	4.25 (1.62-14.55)	<.01
Track and field/cross country	3.45 (0.72-61.89)	.14	3.37 (1.41-11.04)	<.01
Volleyball	10.86 (2.26-194.82)	<.01	11.94 (5.01-38.95)	<.01
Precollegiate shoulder surgery	1.90 (0.74-3.99)	.16	—	—
Precollegiate knee surgery	1.85 (1.16-2.83)	.01	1.34 (1.21-1.47)	<.01
Precollegiate foot/ankle surgery	—	—	1.11 (0.92-1.31)	.27

<sup>a</sup>Sport and precollegiate knee surgery were independent predictors of orthopaedic surgery and rate of orthopaedic surgery in collegiate athletes. —, not applicable.

<sup>b</sup>Reference = female sex.

<sup>c</sup>Reference = golf.

extremity surgery in college. In addition, there was no association between precollegiate foot/ankle surgery with primary lower extremity surgery in college. Sport and precollegiate knee surgery (HR, 4.45; 95% CI, 2.51-7.59) were significant independent predictors of primary knee injury requiring surgery in college. Among these primary knee surgeries, 90.4% resulted from documented acute injuries. Athletes in basketball, football, and volleyball were most likely to sustain a primary knee injury requiring surgery in college, while those in rowing and tennis were least likely to sustain a primary knee injury requiring surgery in college.

Using Poisson regression, precollegiate knee and foot/ankle surgery were univariately associated ( $P \leq .05$ ) with number of orthopaedic surgeries in college per active

seasons (Table 2). Both precollegiate knee and foot/ankle surgery were associated with sport ( $P < .01$ ). Precollegiate shoulder, elbow, and hand/wrist were not univariately associated with the rate of orthopaedic surgeries in college and thus not entered into the multivariate model. In the multivariate Poisson regression model, sport and precollegiate knee surgery (RR, 1.34; 95% CI, 1.21-1.47) were independent predictors of the rate of orthopaedic surgeries in college (Table 3). Athletes in gymnastics, football, and basketball underwent the highest rate of orthopaedic surgeries in college, while those in rowing and golf were underwent the lowest rate of orthopaedic surgeries in college.

Of the 184 athletes with a documented laterality of a precollegiate orthopaedic surgery, 46 (25%) received subsequent

TABLE 4  
Multivariate Cox Proportional Hazards  
Regression for Primary Injuries Requiring Lower  
Extremity Surgery in Collegiate Athletes<sup>a</sup>

Predictor Variable	Hazard Ratio (95% CI)	P Value
Sex <sup>b</sup>	0.96 (0.61-1.51)	.85
Sport <sup>c</sup>		<.01
Baseball/softball	2.81 (0.50-52.64)	.27
Basketball	10.31 (2.03-187.93)	<.01
Football	7.41 (1.57-132.25)	<.01
Gymnastics	13.06 (2.53-239.20)	<.01
Rowing	1.51 (0.19-30.69)	.72
Swimming and diving/water polo	1.55 (0.26-29.33)	.67
Soccer	7.36 (1.54-131.91)	<.01
Tennis	1.75 (0.17-37.63)	.64
Track and field/cross country	2.72 (0.55-49.16)	.26
Volleyball	5.50 (1.07-100.42)	.04
Precollegiate knee surgery	2.77 (1.70-4.35)	<.01

<sup>a</sup>Includes only acute or primary injuries leading to surgery. Secondary surgeries (ie, hardware removals) were excluded. Sport and precollegiate knee surgery were independent predictors of acute or primary lower extremity injury requiring surgery in collegiate athletes.

<sup>b</sup>Reference = female sex.

<sup>c</sup>Reference = golf.

surgery in college. Of these, 25 athletes underwent subsequent surgery in the same extremity; 15 (60%) were linked to an acute injury, and 13 (52%) were reoperations in the same joint. Seven of the 10 athletes with a history of a precollegiate ACL reconstruction received a reoperation in the same knee. Eighteen athletes underwent subsequent surgery in the contralateral extremity, with 14 (78%) linked to an acute injury. Seven athletes received surgeries during college in both the ipsilateral and contralateral extremities. According to both Kaplan-Meier survival estimates and the Cox proportional hazards regression, athletes with a history of precollegiate surgery were more susceptible ( $P = .04$  for both log rank and Cox regression) to subsequent surgery in the ipsilateral extremity versus other extremities (HR, 1.89; 95% CI, 1.03-3.53). In contrast, the risk of subsequent surgery to the contralateral extremity did not differ from that of other extremities ( $P = .54$  for both log rank and Cox regression) (Figure 2).

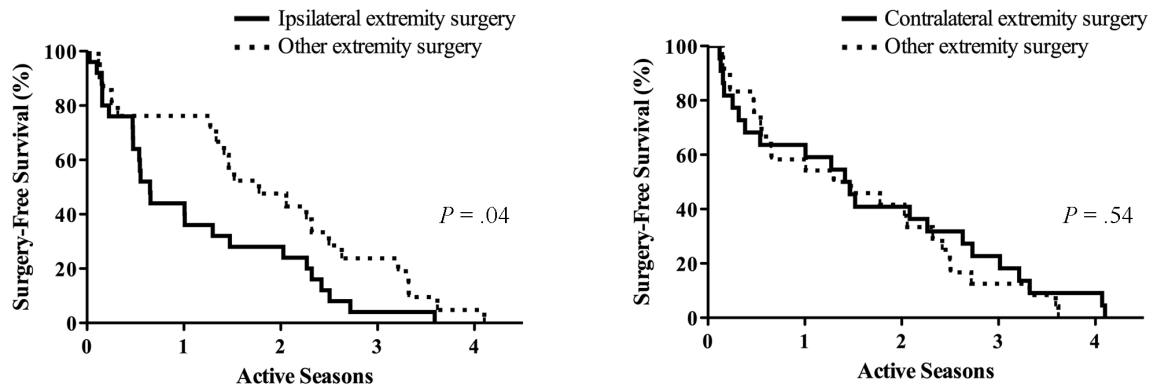
## DISCUSSION

The effect of precollegiate surgery on the collegiate athlete's playing career has become increasingly important to elucidate as high school sports-related injury and surgery has risen in the past decade. Rechel et al<sup>24</sup> retrospectively collected sports-related injury data on high school athletes for 9 sports and reported that those in football, wrestling, girls' soccer, and girls' basketball had the highest rate of injuries requiring surgery. Most of these injuries involved the lower extremity (59%) rather than the upper

extremity (31%), which is consistent with the findings of our study. Participants in gymnastics, a year-round indoor sport, tend to engage in intense training and skill development from an early age because peak performance is thought to occur in adolescence or early adulthood.<sup>9</sup> As a result, gymnasts may be prone to injury and require surgical treatment at an earlier age more so than athletes in other sports. In a retrospective study of competitive girl gymnasts, acute injury rates were greater among older gymnasts, and most injuries were lower extremity soft tissue injuries.<sup>20</sup> In another study, wrist pain in gymnasts was associated with training intensity and years in training.<sup>16</sup> These indirectly support the findings of our study in which a large percentage of matriculating gymnasts had already been treated with upper (11%) and lower extremity (43%) surgery.

This is the first study to our knowledge that suggests that precollegiate knee surgery may place collegiate athletes at risk for earlier and more orthopaedic surgery in college, independent of sex and sport. In addition, those who have had precollegiate knee surgery were more likely to sustain another primary knee injury requiring surgery in college. Perhaps the only other study looking at the relationship between precollegiate and intracollegiate surgery was done by Kamath et al,<sup>14</sup> in which the authors compared athletes who had undergone precollegiate versus intracollegiate ACL reconstruction. The rate of reoperation, which included meniscectomy, synovectomy, and ACL revision surgery, was 51% for the precollegiate group versus 20% for the intracollegiate group. However, the study did not control for exposure time after ACL reconstruction, and thus, the higher reoperation rate in the precollegiate group can be partially attributed to more exposure time. Due to the varying career lengths between the 2 groups, the authors did not perform any statistical comparisons.

In our study, athletes with a history of precollegiate surgery were more likely to receive subsequent surgery in their ipsilateral extremity compared with their other extremities, while there was no additional risk of receiving subsequent surgery in the contralateral extremity. In the Multicenter Orthopaedic Outcomes Network (MOON) cohort of patients undergoing primary ACL reconstruction, the 6-year rate of subsequent surgery was 18.9% in the ipsilateral knee and 10.2% in the contralateral knee.<sup>10</sup> Subsequent surgeries in the ipsilateral knee are common after ACL reconstruction, and our findings corroborate the same phenomenon in the collegiate athlete. In addition, in this study, most athletes who underwent subsequent surgery in college sustained an acute injury that led to the reoperation, suggesting that they did not undergo adequate rehabilitation before returning to play or that they had persistent deficits after surgery. Limb asymmetry and strength deficits in a previously operated extremity are well known, and there is evidence that at the time of completion of rehabilitation and return to activity, athletes still have significant deficits in quadriceps strength after ACL reconstruction,<sup>22,30</sup> internal and external rotation strength after shoulder stabilization,<sup>12,21</sup> and throwing velocity after superior labrum anterior and posterior repair,<sup>8,31</sup> which indirectly support a higher risk of injury in the previously operated extremity.



**Figure 2.** Kaplan-Meier survival estimates and Cox proportional hazards regression for the 46 athletes who received precollegiate surgery and subsequent surgery in the ipsilateral versus contralateral extremity (reference category = other extremity surgery).

In both analyses, athletes with a history of precollegiate surgery were more likely to receive subsequent surgery in their ipsilateral extremity compared with their other extremities, while there was no additional risk of receiving subsequent surgery in the contralateral extremity.

The predictive value of prior orthopaedic surgery on an athlete's playing career has been investigated in professional football players in the National Football League (NFL). Brophy et al<sup>4</sup> looked at participants at the NFL combine and found that athletes with a history of shoulder instability, meniscal injury, and ACL injury were less likely to play in the league compared with athletes without these diagnoses. Furthermore, athletes with more surgical procedures were less likely to play in the league and had shorter careers in terms of games played.<sup>4</sup> In follow-up studies, players who had a history of ACL reconstruction, meniscectomy, or shoulder stabilization had shorter playing careers in select player positions.<sup>5,6</sup> Moreover, offensive linemen were less likely to play in the league after undergoing rotator cuff repair and knee articular cartilage surgery.<sup>6</sup> Although the reasons for not playing in the league or having shorter careers were not ascertained, one can postulate that recurrent injury, the need for surgery, and the associated rehabilitation and time off from competition were strong influences.

There are several limitations to this study. The data were normalized by active seasons played rather than by athlete exposures, which more accurately accounts for injury risk, because practice and competition data were not readily available. Second, tendencies in individual athletic performance may predispose some athletes to injury more than others. These may be related to style of play, inherent physical capabilities, persistent deficits after prior surgery, or a combination thereof. This study could not account for these tendencies. Selection bias is inevitable when examining Division I athletes at a single institution of which a portion were able to overcome a prior injury requiring surgery and return to play at an elite level. In addition, the retrospective study design allows for potential recall bias when gathering precollege surgery data

during PPEs, although data were checked against the written chart and there is no reason to suspect that athletes would misremember the site and laterality of their surgery. Because the details of athletes' past surgeries were not always known, prior surgeries had to be generalized to joint and body part.

Nevertheless, this is the first study to look at the relationship between precollegiate orthopaedic surgery and risk of subsequent injury requiring surgery in collegiate athletes. This retrospective research highlights the increased risk of subsequent injury requiring surgery in athletes with a history of precollegiate knee surgery. Future prospective research should investigate the use of functional tests to measure any existing deficits that an athlete may have after surgery and the role of rehabilitation to limit the risk of reinjury during competition. Injuries requiring surgery pose significant burdens to an athlete's playing career, underscoring the need for injury prevention and improved surgical outcomes in the young athlete.

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