Psychological Readiness is the Main Barrier to Return to Play After Revision Anterior Cruciate Ligament Reconstruction

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Background: Despite advances in modern surgical techniques, return-to-play (RTP) rates after revision anterior cruciate ligament reconstruction (R-ACLR) often fall short of patients' expectations. There is growing awareness that a patient's psychological recovery is as important as the functional recovery of their knee.

Purpose/Hypothesis: The primary purpose of this study was to determine the RTP rate and identify the barriers to RTP after R-ACLR. Secondarily, we compared the progression of psychological readiness (using the Anterior Cruciate Ligament–Return to Sport after Injury [ACL-RSI] scale) throughout rehabilitation between those who achieved RTP and those who did not. Finally, we assessed if RTP could be predicted for patients aged <23 years and patients aged ≥23 years based on their ACL-RSI scores at different time points during rehabilitation.

Study Design: Case-control study; Level of evidence, 3.

Methods: This investigation included 301 patients who underwent R-ACLR at our institution. Preoperatively, patients completed a questionnaire detailing their demographic characteristics and target level of RTP. The ACL-RSI scale was also administered preoperatively and at 3 months, 6 months, and 9 months. At 2 years postoperatively, patients indicated whether or not they had returned to play. Those who did not return provided their reasons for not doing so.

Results: The mean age was 25.4 ± 6.3 years, and 84.5% of patients were male. Although 95.1% of patients undergoing R-ACLR intended to return to play before surgery, only 63.4% achieved this goal at 2-year follow-up. The main barriers to RTP were a fear of reinjury (44%), a lack of confidence in performance (13%), and ongoing knee pain (11%). The mean preoperative ACL-RSI score was significantly higher in patients who returned to play than in those who did not (51.2 ± 23.4 vs 42.6 ± 23.3, respectively; $P = .027$), indicating greater psychological readiness to RTP. The mean ACL-RSI score was also significantly higher in those who achieved RTP at 3 months, 6 months, and 9 months. A preoperative ACL-RSI score of 42.9 points predicted RTP in patients aged <23 years, with a sensitivity of 76% and a specificity of 77% (area under the curve = 0.73). The ACL-RSI score was able to predict RTP at all time points, demonstrating the most accuracy preoperatively and at 6 months postoperatively. At 6 months, a cut-off score of 60.4 points predicted RTP in patients aged <23 years (sensitivity = 62%; specificity = 81%), and a cut-off score of 56.7 points predicted RTP in patients aged ≥23 years (sensitivity = 54%; specificity = 77%).

Conclusion: Psychological readiness, especially fear of reinjury, was a significant barrier to RTP after R-ACLR. Patients with lower psychological readiness who were less likely to return to play could be detected using the ACL-RSI scale.

Keywords: knee ligaments; ACL; meniscus; psychological aspects of sport

The incidence of anterior cruciate ligament (ACL) reinjuries is significant, with reported rates ranging from 1.8% to 10.4% at 5 years postoperatively.[30] For patients aged <20 years, this risk is up to 6 times higher, with second ACL injury rates reported as high as 29% at 5 years.[28] As the number of ACL reconstruction (ACLR) procedures performed continues to rise worldwide, a corresponding increase in revision surgery is anticipated.[15] Revision ACLR (R-ACLR) presents additional physical and psychological challenges, as patients face not only another surgical procedure but must also commit to another period of

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intensive rehabilitation.[5] Furthermore, clinical outcomes are inferior to those after primary ACLR, and patients are less likely to return to play.[10,11,14,29] Despite modern surgical techniques, a recent systematic review indicated that the return-to-play (RTP) rate after R-ACLR was between 58.7% and 69.1% at 2 years postoperatively.[10] Moreover, the same review found that only 35% to 56% of patients returned to their preinjury performance level. This rate often falls below patients' preoperative expectations.[8,25]

The discrepancy between preoperative expectations and actual RTP rates has raised questions about which factors influence an athlete's ability to resume sport participation. An emerging hypothesis in the setting of primary ACLR is that psychological responses to the initial injury, surgical procedure, and rehabilitation process could be significant determinants of an athlete's ability to RTP.[2,9,23] This has led researchers to look beyond traditional physical rehabilitation metrics and consider psychological metrics such as the Anterior Cruciate Ligament–Return to Sport after Injury (ACL-RSI) scale.[21,27] In the setting of primary ACLR, lower ACL-RSI scores have been associated not only with a reduced likelihood of RTP but also an increased risk of a second ACL injury.[4,16] However, the psychological aspect of undergoing R-ACLR and its effect on RTP have not been well explored. This population is particularly interesting because they have previously navigated the surgical and rehabilitation processes, which may uniquely affect their psychological response to recovery.

This study aimed to determine the RTP rate and identify the barriers to RTP after R-ACLR. Secondarily, we compared the progression of psychological readiness (measured by the ACL-RSI score) throughout rehabilitation between those who achieved RTP and those who did not. Finally, we assessed if RTP could be predicted for patients aged <23 years and patients aged ≥ 23 years based on their ACL-RSI scores at different time points during rehabilitation. We hypothesized that psychological factors would have a significant effect on a patient's ability to RTP after R-ACLR and that those who were less likely to return could be identified using the ACL-RSI score.

METHODS

This study analyzed a consecutive cohort of patients who underwent R-ACLR at a single institution between January 2014 and December 2018. Patients were selected from the caseloads of 2 orthopaedic knee surgeons (M.J. and R.M.). All participants provided informed consent before their involvement in this research, and our institution granted ethical approval to undertake this research. All patients were recruited at the time of surgery, and their data were recorded prospectively over 2 years of follow-up.

All patients completed a preoperative questionnaire that detailed their demographic characteristics, mechanism of injury, date of injury, and intention to return to their primary sport. Patients were included if they participated in sports and underwent R-ACLR using a bone–patellar tendon–bone, hamstring tendon, or quadriceps tendon autograft. No allograft was used during the study period. Both single and two-stage revision procedures were included, as were patients who had undergone previous contralateral ACLR. Patients were excluded from the analysis of barriers to RTP if they did not respond at 2 years.

During R-ACLR, both surgeons used equivalent arthroscopic techniques. Graft selection was determined for each patient individually, taking into account the graft harvested during the previous surgical procedure. The revision tunnel was placed at the anatomic footprint of the original ACL. Bone–patellar tendon–bone grafts were harvested from the central third of the patellar tendon and fixed using metal interference screws (Softsilk; Smith & Nephew) on the tibial and femoral sides. Hamstring tendon grafts used an Endobutton (CL Ultra; Smith & Nephew) for femoral fixation and a nonbioabsorbable screw (Biosure PK [Smith & Nephew] or Intrafix [Depuy Mitek] for tibial fixation. Lateral extra-articular tenodesis was employed to augment R-ACLR unless a contraindication was present. Contraindications to lateral extra-articular tenodesis included significant lateral compartment cartilage wear or osteochondral defects, lateral collateral ligament instability or injuries and significant knee stiffness or limited range of motion. All patients underwent routine diagnostic arthroscopic surgery to identify concurrent meniscal and chondral injuries, which were recorded and treated as needed.

Postoperatively, patients were allowed to bear weight as tolerated with crutches used for the first 2 weeks. Bracing was used in select cases at the discretion of the operating surgeon. The majority of patients visited their local physical therapist, given the geographical distribution of the patients. However, all patients were scheduled for consultations and testing during the rehabilitation period at 3 and 6 months and before RTP at our institution. At these

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sessions, several physical and biomechanical performance metrics were recorded to inform the ongoing rehabilitation process. RTP was permitted once an athlete felt physically and psychologically ready and had achieved satisfactory restoration of knee function, as advised by the rehabilitation team and orthopaedic surgeon. This study defined "return to play" as the unrestricted resumption of a patient's preinjury sport in accordance with guidance from the 2016 consensus statement on return to sport.[1] RTP rates were collected at 2 years' follow-up. Patients were asked to record if they had returned to play in their chosen sport. Those who had not returned were asked to specify their primary reasons for not doing so. This was captured using a structured questionnaire comprising predefined response options, with the opportunity to add additional details or other reasons via a free-text field.

The main outcome measure of this study was the ACL-RSI scale.[27] This psychometric tool measures an athlete's psychological readiness to return to sport after ACLR. It assesses 3 primary psychological constructs: emotions (fear of reinjury), confidence in performance, and risk appraisal. The scale consists of 12 questions, rated from 0 to 100, in which 100 indicates the highest psychological readiness to return to sport. The ACL-RSI scale has demonstrated sufficient responsiveness for evaluating the efficacy of psychological interventions at the group level, with a score difference of 1.3 points indicating a genuine clinical change rather than a measurement error.[24] In this study, the ACL-RSI score was collected preoperatively and at 3 months, 6 months, and 9 months postoperatively.

TABLE 1
Baseline Patient Characteristics[a]

	RTP (n = 168)	No RTP (n = 97)	*P*
Sex			.427
Male	143 (85.1)	81 (83.5)	
Female	25 (14.9)	16 (16.5)	
Age, mean ± SD, y	24.4 ± 6.2	26.6 ± 6.5	**.007**
Injured side			.412
Right	85 (50.6)	44 (45.4)	
Left	83 (49.4)	53 (54.6)	
Sport when injured			.304
Gaelic football	82 (48.8)	36 (37.1)	
Hurling	27 (16.1)	13 (13.4)	
Soccer	28 (16.7)	21 (21.6)	
Rugby	15 (8.9)	16 (16.5)	
Other	16 (9.5)	11 (11.3)	
Mechanism of injury			.663
Noncontact	114 (67.9)	65 (67.0)	
Direct contact	29 (17.3)	14 (14.4)	
Indirect contact	25 (14.9)	18 (18.6)	

[a]Data are shown as n (%) unless otherwise indicated. RTP, return to play. Bold indicates statistically significant results.

Statistical Analysis

Descriptive statistics were used to present patient characteristics and other preoperative data. Continuous variables were displayed as the mean and standard deviation or as the median with interquartile range, whereas categorical variables were displayed as numbers and percentages. Categorical variables such as the rate of RTP were compared using the chi-square test. Continuous variables such as the ACL-RSI score were compared using the Mann-Whitney *U* test. The ability of the ACL-RSI scale to predict RTP was assessed using receiver operating characteristic analysis. The area under the curve (AUC) represented the probability that the ACL-RSI score would correctly discriminate between those who achieved RTP and those who did not.[22] An AUC value of 0.5 indicates random guessing, while a value of 1 indicates perfect prediction. After calculating the AUC, the diagnostic sensitivity and specificity for each potential cut-off score were calculated. The maximum Youden index (J) value (sensitivity + specificity – 1) was used to determine the optimal ACL-RSI cut-off score to predict RTP. Sensitivity (true positives/[true positives + false negatives]) represented the proportion of patients who returned to play, who were predicted to return. In contrast, specificity (true negatives/[true negatives + false positives]) represented the proportion of patients who did not return to play, who were predicted not to return (in which a positive value is RTP and a negative value is no RTP). The following interpretation of AUC values was used: ≥0.9, excellent; ≥0.8 to <0.9, very good; ≥0.7 to <0.8, good; ≥0.6 to <0.7, moderate; and ≥0.5 to <0.6, poor.[12] The threshold for statistical significance was set at a P value <.05. Data analyses and graphical presentations were performed using SPSS (Version 29; IBM).

RESULTS

A total of 301 patients underwent R-ACLR during the study period, although 36 patients did not complete the final 2-year follow-up and were excluded. This resulted in an overall follow-up rate of 88.0% and a final cohort of 265 patients. The cohort was predominantly male, with no significant difference in the sex distribution between those who returned to play and those who did not (male: 85.1% vs 83.5%, respectively; P = .427) (Table 1). The patients' ages ranged from 14 to 47 years.

Bone–patellar tendon–bone and hamstring tendon autografts were the most commonly used graft types (Table 2). Lateral extra-articular tenodesis was performed in 49.8% (132/265) of patients. There was a significantly higher incidence of chondral injuries in patients who did not achieve RTP compared with those who did (66.0% vs 51.8%, respectively; P = .025).

Intentions to RTP

Preoperatively, 95.1% (252/265) of patients expressed the desire to RTP (Table 3). Despite this, the overall RTP rate was 63.4% (168/265) at 2 years. The group that returned to play expressed a stronger preoperative desire to return to the same or a higher level of sport (P <

TABLE 2
Intraoperative Data[a]

	RTP (n = 168)	No RTP (n = 97)	*P*
Graft type			**.042**
Bone–patellar tendon–bone	100 (59.5)	51 (52.6)	
Hamstring tendon	62 (36.9)	35 (36.1)	
Quadriceps tendon	6 (3.6)	11 (11.3)	
Lateral extra-articular tenodesis	83 (49.4)	49 (50.5)	.862
Concomitant injuries			
Medial collateral ligament injury	4 (2.4)	3 (3.1)	.728
Lateral collateral ligament injury	6 (3.6)	2 (2.1)	.489
Posterior cruciate ligament injury	3 (1.8)	0 (0.0)	.186
Medial meniscal tear	59 (35.1)	34 (35.1)	.991
Lateral meniscal tear	60 (35.7)	41 (42.3)	.290
Chondral injury	87 (51.8)	64 (66.0)	**.025**

[a]Data are shown as n (%). RTP, return to play. Bold indicates statistically significant results.

TABLE 3
Preoperative RTP Expectations[a]

	Total (n = 265)	RTP (n = 168)	No RTP (n = 97)	*P*
Higher level	50 (18.9)	41 (24.4)	9 (9.3)	**<.001**
Same level	185 (69.8)	122 (72.6)	63 (64.9)	
Lower level	17 (6.4)	5 (3.0)	12 (12.4)	
No sport	7 (2.6)	0 (0.0)	7 (7.2)	
Different sport	6 (2.3)	0 (0.0)	6 (6.2)	

[a]Data are shown as n (%). RTP, return to play. Bold indicates statistically significant results.

.001). There were 4.9% (13/265) of patients who decided to retire (no sport) or play a different sport before undergoing revision surgery. Those who achieved RTP were significantly younger than those who did not (24.4 ± 6.2 vs 26.6 ± 6.5 years, respectively; $P = .007$). There was no difference in the time from a second ACL injury to R-ACLR between those who achieved RTP and those who did not (4.2 ± 5.8 vs 4.2 ± 3.5 months, respectively; $P = .667$).

Barriers to RTP

There were 97 patients (36.6%) who had not returned to play at 2 years' follow-up. The predominant reason for not returning to play was a fear of reinjury (44%) (Figure 1). The second most common reason was a lack of confidence in performance, which was reported by 13% of patients. A minority did not return to play because of factors related to the operated knee, such as residual knee pain (11%) or a reinjury (4%).

Additionally, 13 patients decided to retire (n = 7) or change sports (n = 6) before surgery. Interestingly, even though the decision was made preoperatively, the motivations for avoiding RTP remained largely the same. Among those who retired, 57.1% (4/7) reported a fear of reinjury, 28.6% (2/7) reported ongoing knee pain, 14.3% (1/7) reported a lack of confidence in performance, and 14.3% (1/7) were advised by a health care professional not to return. Among those who decided to change sports, 33.3% (2/6) reported a fear of reinjury, 33.3% (2/6) felt that they were too old to keep playing, 16.7% (1/6) suffered a reinjury, and 16.7% (1/6) were advised to change sports.

Ability of ACL-RSI Score to Predict RTP

Only patients who indicated a preoperative desire to RTP were included in the analysis of ACL-RSI scores (95.1% [252/265]). The mean ACL-RSI score for patients who returned to play increased gradually during the rehabilitation period compared with their preoperative score (Table 4). Patients who did not return to play had significantly lower preoperative ACL-RSI scores than those who returned to play (42.6 ± 23.3 vs 51.2 ± 23.4, respectively; $P = .027$). Furthermore, there were significant differences in ACL-RSI scores at every time point during the follow-up period.

Preoperatively, the ACL-RSI score demonstrated good predictive power for RTP among patients aged <23 years (AUC = 0.73) using a threshold of 42.9 points (76% sensitivity; 77% specificity). However, it was less discriminative for those aged ≥23 years (AUC = 0.56) (Table 5 and Figure 2A). At 3 months, the overall predictive capability was similar for both the <23-year and ≥23-year age

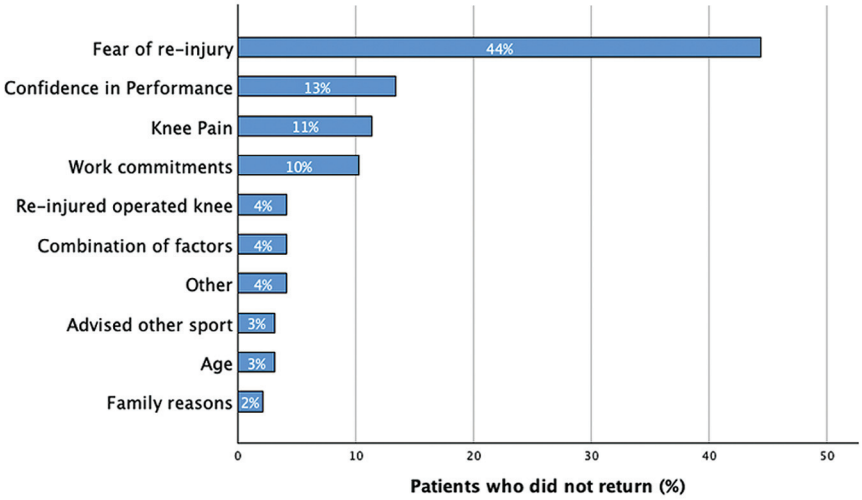

Figure 1. Factors reported by patients as barriers to return to play after revision anterior cruciate ligament reconstruction (n = 97).

TABLE 4
ACL-RSI Scores[a]

	n	RTP	No RTP	*P*
Preoperative	193/252	51.2 ± 23.4	42.6 ± 23.3	**.027**
3 mo	206/252	52.8 ± 21.1	42.9 ± 25.8	**.007**
6 mo	188/252	61.0 ± 19.5	44.5 ± 20.2	**<.001**
9 mo	206/252	64.2 ± 22.3	52.9 ± 28.9	**<.001**

[a]Data are shown as mean ± SD. ACL-RSI, Anterior Cruciate Ligament–Return to Sport after Injury; RTP, return to play. Bold indicates statistically significant results.

TABLE 5
Predictability of ACL-RSI Score for RTP[a]

	n	AUC (95% CI)	Cut-off Score	Sensitivity	Specificity	Youden Index
Preoperative						
Age <23 y	80	0.73 (0.59-0.87)	42.9	76%	77%	0.43
Age ≥23 y	113	0.56 (0.45-0.66)	34.6	73%	45%	0.18
3 mo						
Age <23 y	95	0.66 (0.53-0.79)	44.6	71%	63%	0.28
Age ≥23 y	111	0.62 (0.51-0.73)	47.1	42%	63%	0.21
6 mo						
Age <23 y	87	0.77 (0.63-0.91)	60.4	62%	81%	0.43
Age ≥23 y	101	0.71 (0.60-0.82)	56.7	54%	77%	0.32
9 mo						
Age <23 y	91	0.70 (0.56-0.84)	56.3	76%	77%	0.42
Age ≥23 y	115	0.59 (0.48-0.69)	60.0	61%	60%	0.23

[a]ACL-RSI, Anterior Cruciate Ligament–Return to Sport after Injury; AUC, area under the curve; RTP, return to play.

groups but had declined slightly (AUC = 0.66 vs 0.62, respectively) (Figure 2B).

At 6 months, however, it performed best in both groups, with AUC values of 0.77 (<23 years; cut-off score = 60.4 points; 62% sensitivity; 81% specificity) and 0.71 (≥23 years; cut-off score = 56.7 points; 54% sensitivity; 77% specificity) (Figure 2C). By 9 months, when most patients had completed supervised rehabilitation, the ACL-RSI score remained a good predictor of RTP, particularly in younger patients (AUC = 0.70) (Figure 2D).

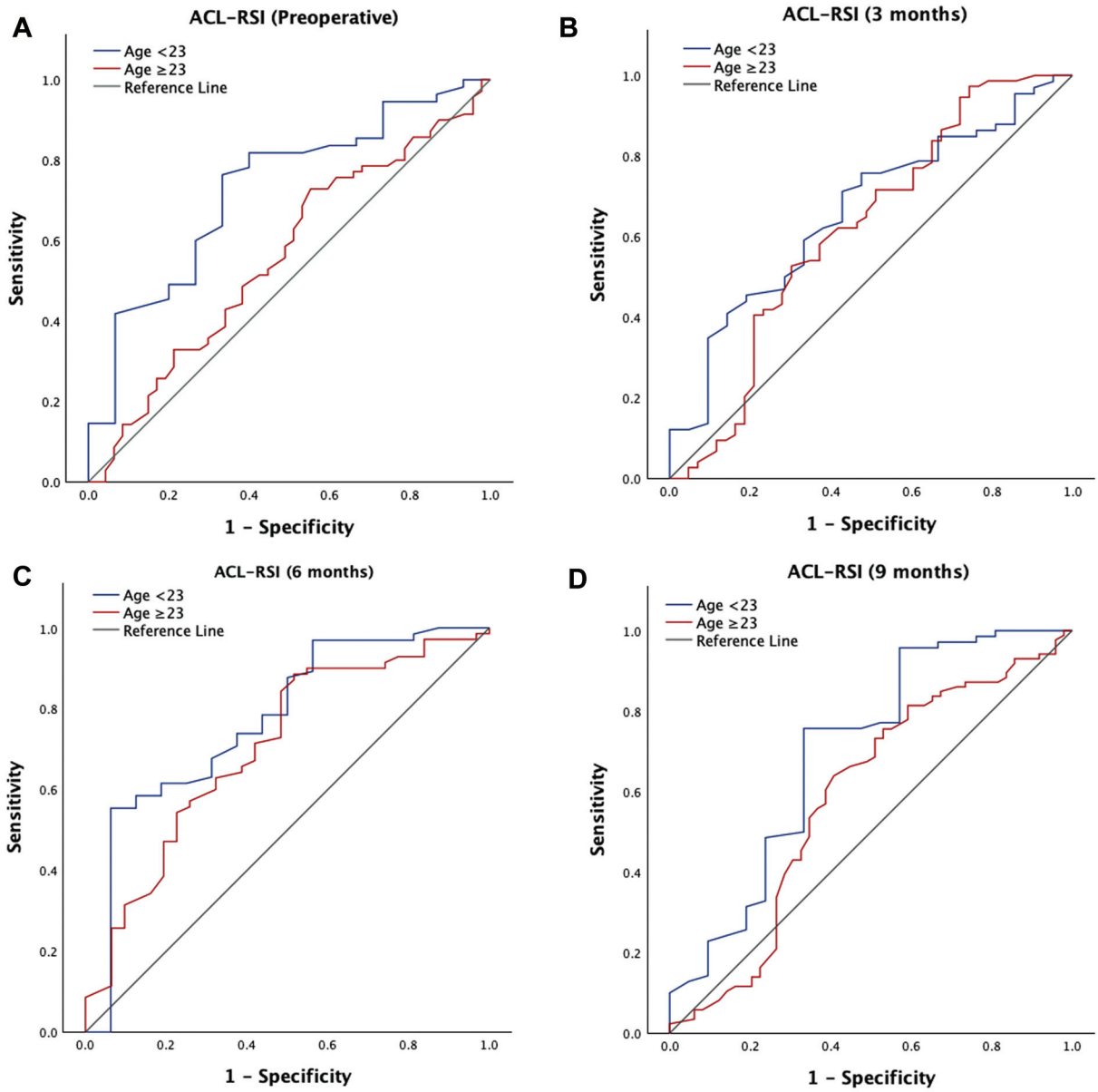

Figure 2. (A-D) The receiver operating characteristic curve for the Anterior Cruciate Ligament–Return to Sport after Injury (ACL-RSI) score illustrates how well it predicts return to play at different time points for patients after revision anterior cruciate ligament reconstruction.

DISCUSSION

This study demonstrated that psychological readiness, particularly a fear of reinjury and a lack of confidence in performance, were the main barriers to RTP after R-ACLR. These factors were likely the main reason for the discrepancy between preoperative expectations (95.1%) and the actual RTP rate (63.4%). Furthermore, we found that patients who returned to play exhibited higher ACL-RSI scores at all postoperative time points than those who did not return. Therefore, by applying specific ACL-RSI cutoff scores at different time points, we could predict which patients were progressing toward RTP. These findings highlight the importance of recognizing and addressing psychological readiness during rehabilitation for patients who have undergone R-ACLR.

The RTP rate in our study fell significantly below our patients' preoperative expectations. The discrepancy between patients' high expectations and the actual outcomes of ACLR has been well documented in the literature.[3,8] Feucht et al[8] found that although expectations were lower after R-ACLR compared with primary ACLR, they were still extremely high, with 84% of patients expecting a normal or near-normal knee postoperatively. Similarly, Webster and Feller[25] reported that although RTP expectations were lower in patients who had undergone

previous ACL surgery, most patients anticipated returning to their preoperative sporting level. This suggests that patients may not fully appreciate the psychological challenges that accompany the physical element of recovery after R-ACLR.

Fear of reinjury (44%) and a lack of confidence in performance (13%) were the predominant barriers to RTP in our study. Although this has not been specifically investigated in the setting of R-ACLR, it aligns with findings from other studies that have examined the barriers to RTP after primary ACLR.[2,7,9] However, our results suggest that the psychological effect is substantially greater in those who have undergone R-ACLR. For example, Toale et al[23] examined a cohort of patients after primary ACLR and found that the proportion of those who successfully returned to play was much higher (83.7%). Among those who did not return, 27.5% cited a fear of reinjury, and 19.4% lacked confidence in their performance. A significant proportion of this cohort also chose not to return for nonpsychological factors: for example, work commitments (13%) or "other reasons" (16.2%).[23] This highlights the magnitude of the psychological aspect of undergoing R-ACLR. Studies have shown that a fear of reinjury after ACLR is mainly shaped by the prospect of undergoing surgery and the recovery process again, the nature of the sport that they engaged in before the injury, a patient's personality traits, and their social priorities.[19]

ACL-RSI scores after R-ACLR appear to be lower at the time of RTP compared to those observed after primary ACLR.[6,23] This has been reported by other studies, highlighting a difference in psychological readiness between the 2 populations. Duncan et al[6] demonstrated that the mean ACL-RSI score at the time of RTP (9.4 ± 2.0 months) was significantly lower in the R-ACLR group compared with the primary ACLR group (77.4 ± 19.4 vs 85.3 ± 17.4, respectively; $P = .011$). Furthermore, those who underwent R-ACLR required more time to achieve their minimum RTP criteria and therefore took a longer time to RTP.[6] Similarly, Lefevre et al[13] reported that at 12 months postoperatively, the mean ACL-RSI score was significantly lower in the revision group compared with the primary group (49.5 ± 24.8 vs 65.0 ± 23.0, respectively; $P < .001$), despite no difference in rates of return to sporting activity. However, they observed that 55.8% of patients in the primary group participating in pivoting sports had returned to training activity compared with only 45.8% in the revision group.[13] Another study by Carolan et al[5] reported that at 9 months postoperatively, the mean ACL-RSI score was significantly lower in the R-ACLR group than in the primary ACLR group (55.9 ± 22.9 vs 75.5 ± 15.9, respectively; $P < .001$). This study found that although patients undergoing R-ACLR could attain comparable physical strength metrics to those observed after primary ACLR, deficits in psychological readiness emerged as the main contributors to their reduced RTP rates.

The preoperative ACL-RSI scores of patients who returned to play in our study were significantly higher than those of patients who did not return. Furthermore, compared with those who did not return, those who achieved RTP demonstrated a gradual incremental improvement in the ACL-RSI score throughout rehabilitation. This resulted in higher scores at all follow-up time points. Few studies have tracked the progression of ACL-RSI scores throughout rehabilitation, and this is the first to have done so for patients after R-ACLR. The significance of ACL-RSI score progression has been highlighted by McPherson et al,[17] who demonstrated that slower improvements in psychological readiness from preoperatively to 12 months postoperatively were not only linked to lower rates of RTP but also associated with an increased risk of sustaining a second ACL injury. Similarly, Sadeqi et al[20] demonstrated a significant association between the progression of ACL-RSI scores and successful return to sport and better knee function outcomes. They concluded that regular psychological assessments form an integral part of holistic care, as they help pinpoint critical periods when patients may need additional resources or support.[20]

We also found that the ACL-RSI score was most predictive at 6 months for both the older and younger age groups. This was interesting because one would assume that a score collected closer to the time of RTP would be more predictive. However, emotional responses throughout recovery fluctuate, are nonlinear, and become heightened as the time to RTP approaches.[18] A systematic review by Sell et al[21] noted that ACL-RSI scores increased at 3 months and 6 months postoperatively relative to preoperatively but that they then remained stable until 2 years postoperatively. It is plausible that 6 months reflects a time point before the reality of RTP becomes fully apparent. Later time points may also capture patients who are currently experiencing the challenges of gradually reengaging in a pivoting sport. The ideal timing for obtaining the ACL-RSI score has not been well investigated in previous studies, although it is likely that measuring multiple time points is optimal.

For patients aged <23 years, scores of 60.4 points at 6 months and 56.3 points at 9 months may be used to discriminate those who will not return to play. Similarly, Webster and Feller[26] found that among adolescent athletes who underwent primary ACLR, the ACL-RSI score at 6 months was predictive (AUC = 0.70) of RTP by 9 months. Although this is the first study to define cut-off scores in the revision setting, previous research by Ardern et al[4] set a 56-point threshold at 9 months for returning to the same preinjury sport after primary ACLR. However, there is a range of optimal cut-off scores reported in the literature, with other studies reporting ACL-RSI threshold scores at 6 months after ACLR ranging from 51 to 60 points and cut-off scores as high as 65 points at 9 months.[20,21] It is also important to note that the ACL-RSI score, while effective at detecting psychological changes at the group level, is less sensitive to the nuanced psychological responses of individual patients.[24] Webster and Feller[24] identified that the smallest detectable change—that is, the minimum score change needed to overcome measurement errors—was 1.8 for male patients and 1.7 for female patients in group analyses but exceeded 20 points for individual assessments.

We also found that psychological readiness measured before surgery effectively predicted which patients would

return to play, particularly among those aged <23 years. RTP rates were also higher in those who were younger. Sport participation is closely linked with school and university teams, and this age may reflect a natural transition point away from structured pivoting sports. Younger patients are also likely less influenced by the social and work-related factors that we identified as other barriers to RTP.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, although the sample size is large and the follow-up duration was adequate, the ACL-RSI scale was the only measure of psychological readiness used. The study's quantitative focus might overlook nuanced psychological and personal factors that qualitative methods would define further. Additionally, the absence of a control group, such as patients who were treated nonsurgically, limits our ability to compare outcomes directly and understand the unique challenges associated with R-ACLR. We also did not analyze the time between primary ACLR and R-ACLR, which may influence psychological readiness. Future studies should be therapeutic and prospective, investigating the effectiveness of psychological interventions, such as cognitive-behavioral therapy or motivational techniques. This would provide valuable insights into improving RTP rates among patients undergoing R-ACLR.

CONCLUSION

Overall, the RTP rate after R-ACLR was 63.4%, despite 95.1% of patients who preoperatively planned to return. The main barriers to RTP were a fear of reinjury and a lack of confidence in performance, not factors relating to knee function or stability. The preoperative ACL-RSI score was higher in patients who successfully returned to play. It was also higher throughout the rehabilitation period and displayed a quicker recovery trajectory. The ACL-RSI scale can be used to help predict those who are less likely to return to play after R-ACLR.

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