Original Research

Association of the COVID-19 Pandemic With Outcomes After Anterior Cruciate Ligament Reconstruction

A Retrospective Comparative Study Examining Changes in Health Care Access, Delivery, and Functional Outcomes

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Background: Structured rehabilitation optimizes outcomes and reduces reinjury risk after anterior cruciate ligament reconstruction (ACLR). The coronavirus 2019 (COVID-19) pandemic interrupted standard rehabilitation, possibly affecting ACLR outcomes.

Purpose: To characterize changes to ACLR functional outcomes related to the COVID-19 pandemic.

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

Methods: Patients who underwent ACLR between June 11, 2019, and March 11, 2020, (postpandemic group) were compared retrospectively with those who underwent ACLR the year before (June 11, 2018, to March 11, 2019). A mixed-effects linear regression model was used to estimate group differences in isokinetic quadriceps testing. A Kaplan-Meier analysis assessed the probability of achieving >90% limb symmetry index (LSI) for isokinetic quadriceps strength at 60 deg/s and passing all return-to-sport functional outcomes at 1 year postoperatively.

Results: A total of 176 patients (80 in the control group and 96 in the postpandemic group) were included. The rate of achieving >90% LSI in isokinetic strength at 60 deg/s at 1 year postoperatively was 39% (95% CI, 27%-49%) for the control group versus 22% (95% CI, 13%-30%) for the postpandemic group (*P* = .01). Similarly, the rate of achieving >90% LSI in all functional tests at 1 year postoperatively was 15% (95% CI, 7%-22%) for the control group versus 7% (95% CI, 2%-12%) for the postpandemic group (*P* = .04). The number of in-person physical therapy visits per patient was 25.8 ± 6.8 in the control group versus 24.4 ± 7.5 in the postpandemic group (*P* = .23). Only the postpandemic group accessed physical therapy using remote telemedicine. Each additional telehealth rehabilitation visit was associated with a 1-week delay in achieving >90% LSI in isokinetic quadriceps strength for the postpandemic group.

Conclusion: The COVID-19 pandemic was associated with a decrease in lower extremity strength and a lower probability of achieving limb symmetry and passing the criteria for return to sport at 1 year postoperatively. These results were not due to lack of access to physical therapy.

Keywords: COVID-19; ACL reconstruction; functional outcomes

An anterior cruciate ligament tear is a common and devastating injury treated routinely with surgical reconstruction (ACLR) and prolonged skilled postoperative rehabilitation.[15] Return to preinjury activities occurs in nearly 83% of patients by 1 year after surgery and depends largely on their postoperative rehabilitation.[17,29] Structured rehabilitation combines focused exercises, patient education, and neuromuscular retraining to optimize outcomes and reduce the risk of reinjury.[1]

The ability of patients to progress functionally depends on rehabilitative milestone achievement.[26] For example,

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return-to-sport (RTS) criteria have been established based upon normative data to assist in guiding a patient's safe return to play.[13,16,20,22] Recently, the coronavirus 2019 (COVID-19) pandemic resulted in changes to health care,[2,6,23] including social distancing, facial coverings, vaccinations, telemedicine visits, and pausing elective surgery.[1,5,9] However, the effects of the pandemic on ACLR outcomes and the response of health care-related services to mitigate those effects are not known.

In the current study, we aimed to characterize the changes related to rehabilitation delivery and to determine the effects on ACLR functional outcomes after the COVID-19 pandemic. Our hypothesis was that the COVID-19 pandemic resulted in a conformational change in the way rehabilitation services were accessed, resulting in lower functional ACLR outcomes.

METHODS

Cohort Selection

Approval for this retrospective, single institution, cohort study was received from our institutional review board. Eligible participants were patients between the ages of 15 and 55 years who had undergone ACLR between June 11, 2018, and March 11, 2020, by 1 of 4 fellowship-trained orthopaedic sports medicine surgeons (including B.E.W. and G.S.B.). Patients were excluded if they had undergone multiligament reconstruction, physeal sparing ACLR, had a previous knee surgery, or had lack of follow-up data.

The US Centers for Disease Control and Prevention (CDC) pronounced coronavirus 2019 (COVID-19) a pandemic in March 2020. This pronouncement disrupted traditional rehabilitation practices after ACLR. Therefore, patients who had undergone surgery up to 9 months before March 11, 2020, would have had a portion, if not all, of their 9-month rehabilitation period affected by the COVID-19 pandemic and were defined as the postpandemic group. Patients who had undergone ACLR the year before (June 11, 2018, to March 11, 2019) and had completed at least 12 months of rehabilitation without interruption were included as a comparative cohort control.

Postoperative Rehabilitation Protocol and Access

A standardized physical therapy protocol was used over the entire study period. This consisted of an initial visit within 3 days after ACLR and then twice weekly visits for 6 weeks. Future follow-up was determined by patient progress. Patients who underwent surgery immediately before the CDC pronouncement of the COVID-19 pandemic were identified as high priority. These patients were seen by the physical therapist in person during their initial 6 weeks of care postoperatively due to wound management and the need for direct supervision with their home program to maintain postoperative precautions. At 6 weeks postoperatively, patients were supervised by the physical therapist with telemedicine to progress through their home program. Functional outcome testing for both groups began at 3 months postoperatively and was repeated every 2 months (3, 5, 7, 9, and 12 months postoperatively) until patients met the passing criteria.

Functional Outcome Performance Measurements

At 3 months postoperatively, and then every 2 months subsequently until the patient met RTS guidelines, quadriceps and hamstrings strength measurements were collected using an isokinetic dynamometer (Biodex Medical Systems) for both the involved and uninvolved limbs. Patients performed an active warm-up on a stationary bicycle for 5 minutes before testing. For all testing procedures, the uninvolved extremity was tested first. Both isokinetic and functional testing were performed on the same day, and patients completed a graded warm-up before data collection for all testing to acclimate to the effort on the isokinetic dynamometer.

On the dynamometer, patients were seated upright with a thigh and lap strap. The dynamometer head was lined up with the lateral epicondyle of the femur, and a distal ankle strap was placed just above the lateral malleolus with range-of-motion limits of flexion until contact with the seat and full knee extension. Testing was completed at 60 deg/s and 240 deg/s based on previous literature.[19] Patients completed 5 trials at 60 deg/s and 5 trials at 240 deg/s with 30-second rests between speeds. Peak torque (N·m) was recorded for knee extension (quadriceps) and flexion (hamstrings) as a limb symmetry index (LSI; expressed as a percentage), calculated as the ratio of the ACLR limb to the contralateral limb: LSI = (peak torque, ACLR limb/peak torque, contralateral limb) $\times$ 100.[21] Peak torque relative to bodyweight (PT/BW) was also computed.

When a patient achieved >70% LSI, peak impact training was initiated. Four single-leg impact tests were performed, with patients completing a graded warm-up

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Ethical approval for this study was waived by the University of Wisconsin-Madison (ref No. 2021-1197).

TABLE 1
Comparison of Baseline Characteristics of ACLR Group Before and After the COVID-19 Pandemic[a]

Parameter	Control (n = 80)	Postpandemic (n = 96)	*P*
Age, y	20.5 [17.0-28.0]	22.0 [16.8-34.3]	.365
BMI, kg/m^2	24.6 [22.4-26.7]	24.4 [22.4-28.6]	.506
Sex			.130
Female	40 (49.0)	60 (62.5)	
Male	40 (50.0)	36 (37.5)	
Laterality			.302
Right	43 (53.8)	43 (44.8)	
Left	37 (46.3)	53 (55.2)	
Graft type			.637
Patellar tendon autograft	39 (48.8)	50 (52.1)	
HS autograft	39 (48.8)	40 (41.7)	
QT autograft	1 (1.2)	3 (3.1)	
AT allograft	1 (1.2)	3 (3.1)	

[a]Data are presented as median [IQR] or count (%). ACLR, anterior cruciate ligament reconstruction; AT, Achilles tendon; BMI, body mass index; COVID-19, coronavirus 2019; HS, hamstring tendon; IQR, interquartile range; QT, quadriceps tendon.

before all maximal-effort hop testing. A single-leg hop for height was recorded using force plates (AMTI), with height computed using the time-in-air method (height = $\frac{1}{2}gt^2$, where g is the gravitational constant [9.8 m/s^2] and t is the time in the air measured from the force plate). For the 4-hop test, 3 successful trials were recorded as the patient performed 4 maximal hops with the instruction to perform “4 hops as quickly and as high as possible” while staying with the boundaries of an in-ground force plate and stabilizing for 2 seconds upon landing. Ground contact time, average height, and a reactive power index (ratio of ground contact time to flight time) were extracted from the force-plate recording, and LSIs were computed for each metric. The last 2 single-leg impact tests performed were the horizontal hop for distance and the 4-crossover hop. For the horizontal hop, patients were instructed to start on 1 foot and hop as far forward as possible, landing and stabilizing for 2 seconds. The distance measured was from the start line (toe) to the heel on landing (Supplemental Figure S1A, available separately). For the 4-crossover hop, the patient hopped on the same leg 4 consecutive times without losing balance, clearing a 4-inch (10-cm) tape on the floor for each hop (Supplemental Figure S1B). These tests were performed with both the uninvolved and involved leg alternately until 3 successful trials were completed, and results were recorded as LSIs.

RTS Criteria

RTS criteria were defined as the ability to achieve >90% LSI for peak quadriceps torque at 60 deg/s, as well as maximal single-leg hop height, horizontal hop for distance, and 4-crossover hop.[13]

Statistical Analyses

Data are presented as means with standard deviations for normally distributed data, medians with interquartile ranges (IQRs) for nonnormally distributed data, and counts with percentages for categorical data. Normal distribution was determined by qualitatively evaluating the residual Q-Q plots and quantitatively by the Shapiro-Wilk test. Continuous variables were analyzed with the Student *t* test where normally distributed and the Mann-Whitney *U* test where nonnormally distributed. The Fisher exact test was used to analyze categorical data. Mixed-effects linear regression analysis was used to estimate group differences in isokinetic strength. A Kaplan-Meier analysis assessed the probability of achieving >90% LSI in isokinetic quadriceps strength at 60 deg/s and passing the RTS criteria at 1 year postoperatively. Data are presented as the cumulative event rate of achieving the threshold of limb symmetry and RTS criteria. Statistical significance was determined at $P < .05$. Calculations were performed using R for statistical computing (Version 2022.07.2; R Core Team).

RESULTS

A total of 205 patients were initially identified. Of these, 29 patients (14.1%) were excluded: 13 with incomplete follow-up, 11 with previous knee surgery, and 5 with multiligament reconstruction. Ultimately, 176 patients met the inclusion criteria: 80 in the control group and 96 in the postpandemic group. Demographic data were summarized, and baseline characteristics were compared between the groups (Table 1).

Effect of the COVID-19 Pandemic on Postoperative Lower Extremity Strength

Mean lower extremity strength increased with time after surgery in both groups (Supplemental Figure S2, available separately). To control for a patient’s initial strength, repeated measures, and variations in the time testing, a mixed-effects linear regression was fitted to the data to estimate the group differences in strength regarding

TABLE 2
Estimated Differences in Isokinetic Strength in ACLR Group Before and After the COVID-19 Pandemic[a]

Parameter	Quadriceps, 60 deg/s		Hamstrings, 60 deg/s	
Random effect	Variance ± SD	R^2	Variance ± SD	R^2
Subject	762.9 ± 27.62	0.90	267.42 ± 16.35	0.89
Fixed effects	Estimate (95% CI)	*P*	Estimate (95% CI)	*P*
Intercept	12.34 (-15.63 to 40.31)	.386	8.83 (-7.66 to 25.32)	.293
Control group	9.46 (0.57 to 18.35)	**.037**	9.65 (4.39 to 14.90)	<**.001**
Months postop	4.80 (4.25 to 5.40)	<**.001**	2.10 (1.80 to 2.40)	<**.001**
Male sex	27.86 (20.28 to 35.43)	<**.001**	11.90 (7.46 to 16.35)	<**.001**
Patellar tendon graft	-6.84 (-15.63 to 1.95)	.127	10.56 (5.38 to 15.75)	<**.001**
BMI, kg/m^2	2.16 (1.14 to 3.18)	<**.001**	1.08 (0.48 to 1.68)	<**.001**
Age, y	-0.67 (-1.14 to -0.20)	**.005**	-0.21 (-0.49 to 0.06)	.132
	Quadriceps, 240 deg/s		Hamstrings, 240 deg/s	
Random effect	Variance ± SD	R^2	Variance ± SD	R^2
Subject	253.66 ± 15.93	0.90	118.71 ± 10.90	0.84
Fixed effects	Estimate (95% CI)	*P*	Estimate (95% CI)	*P*
Intercept	14.06 (-1.94 to 30.07)	.085	12.19 (0.80 to 23.59)	**.036**
Control group	6.36 (1.25 to 11.47)	**.015**	6.57 (3.00 to 10.14)	<**.001**
Months postop	2.70 (2.40 to 3.00)	<**.001**	1.20 (0.90 to 1.50)	<**.001**
Male sex	16.30 (12.01 to 20.59)	<**.001**	9.22 (6.03 to 12.42)	<**.001**
Patellar tendon graft	-2.47 (-7.50 to 2.56)	.336	6.83 (3.26 to 10.40)	<**.001**
BMI, kg/m^2	1.33 (0.75 to 1.91)	<**.001**	0.59 (0.18 to 1.01)	**.005**
Age, y	-0.42 (-0.69 to -0.15)	**.002**	-0.11 (-0.30 to 0.07)	.232

[a]Model: strength (N·m) ≈ (1|subject) + group + postoperative time + sex + graft type + age. Boldface *P* values indicate statistical significance ($P < .05$). ACLR, anterior cruciate ligament reconstruction; BMI, body mass index; CI, confidence interval; COVID-19, coronavirus 2019; postop, postoperatively.

TABLE 3
Estimated Differences in Isokinetic Extension PT/BW in ACLR Group Before and After the COVID-19 Pandemic[a]

Parameter	Quadriceps		Hamstrings	
Random effect	Variance ± SD	R^2	Variance ± SD	R^2
Subject	0.02 ± 0.14	0.87	0.01 ± 0.07	0.85
Fixed effects	Estimate (95% CI)	*P*	Estimate (95% CI)	*P*
Intercept	0.47 (0.39 to 0.55)	<**.001**	0.31 (0.28 to 0.35)	<**.001**
Control group	0.05 (0.01 to 0.10)	**.035**	0.05 (0.03 to 0.08)	<**.001**
Time (every 3 mo postop)	0.09 (0.08 to 0.10)	<**.001**	0.04 (0.03 to 0.04)	<**.001**
Male sex	0.12 (0.08 to 0.16)	<**.001**	0.05 (0.03 to 0.07)	<**.001**
Patellar tendon graft	-0.07 (-0.11 to -0.02)	**.005**	0.05 (0.03 to 0.07)	<**.001**
Age (every 10 y)	-0.05 (-0.08 to -0.03)	<**.001**	-0.02 (-0.04 to -0.01)	<**.001**

[a]Model: strength (N·m) ≈ (1subject) + group (N·m/kg) + postoperative time + sex + graft type + age. Boldface *P* values indicate statistical significance ($P < .05$). ACLR, anterior cruciate ligament reconstruction; CI, confidence interval; COVID-19, coronavirus 2019; postop, postoperatively; PT/BW, peak torque relative to bodyweight.

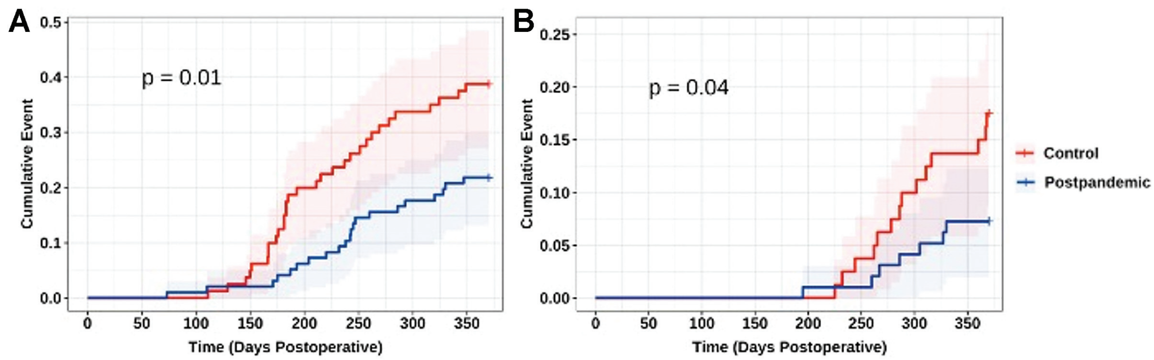

Figure 1. Kaplan-Meier analysis of achieving (A) >90% LSI for isokinetic quadriceps testing and (B) the threshold for RTS. The solid line represents the mean value, and shaded areas represent 95% CIs. CI, confidence interval; LSI, limb symmetry index; RTS, return to sport.

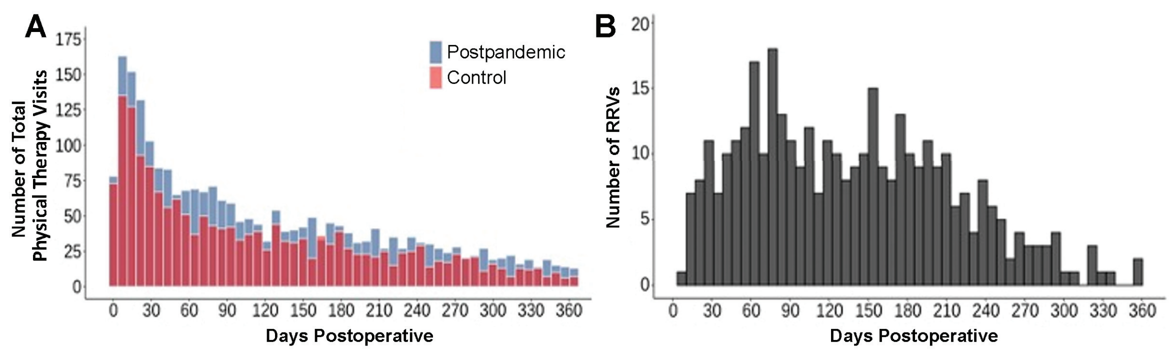

Figure 2. (A) Histogram representation of the relative frequency of the total (in-person and RRVs) physical therapy visits between the control and postpandemic groups. (B) Histogram representation of the frequency of RRVs for the postpandemic group. RRV, remote rehabilitation visit.

isokinetic testing. All isokinetic strength improved with time after surgery (Table 2). Isokinetic strength was greater in the control group versus the postpandemic group across all measurements. The largest between-group estimates were found for testing at 60 deg/s.

A mixed-effects linear regression was fitted to the data to estimate the difference in PT/BW between groups. Again, quadriceps and hamstrings PT/BW increased with increased postoperative time (Supplemental Figure S3, available separately). PT/BW was significantly greater in the control group for both the quadriceps and hamstrings (Table 3).

Effect of the COVID-19 Pandemic on Ability to Achieve Quadriceps Limb Symmetry and RTS Criteria at 1 Year Postoperatively

The cumulative incidence of achieving limb symmetry of quadriceps strength at 1 year postoperatively for the control group was 39% (95% CI, 27%-49%) compared with 22% (95% CI, 13%-30%) for the postpandemic group (P = .01) (Figure 1A). When comparing the incidence of passing the RTS criteria between groups, the cumulative incidence at 1 year postoperatively for the control group was 15% (95% CI, 7%-22%) compared with 7% (95% CI, 2%-12%) in the postpandemic group (P = .04) (Figure 1B).

Effect of the COVID-19 Pandemic on Access and Delivery of Rehabilitation Services

A total of 4196 therapy contacts, including in-person and remote rehabilitation visits (RRVs), were completed between both groups. There were 1797 total therapy visits in the control group and 2399 total visits in the postpandemic group. Physical therapy data were available for a total of 156 patients (control group: 70 and postpandemic group: 86). The total number of patients with at least 1 missed appointment was 32 (20.5%). The total number of patients in the control group with at least 1 missed appointment was 17 (24.3%) compared with 15 (17.4%) in the postpandemic group (P = .323). The rate of missed appointments (total missed/total appointments) was 1.2% (51/4196). The rate of missed appointments for patients in the control group was 1.2% (22/1797) compared with 1.2% (29/2399) in the postpandemic group ($P > .999$).

Access to postoperative physical therapy for the control and postpandemic groups was most frequent within the first 2 weeks after surgery, followed by a weekly reduction

TABLE 4
Estimated Differences in Time to Achieve Isokinetic Quadriceps Strength Symmetry and Number of Telemedicine Rehabilitation Visits in Postpandemic Group[a]

Linear Fixed-Effects Model[b]	Estimate (95% CI)	P
Intercept	242.88 (191.88-291.89)	**<.001**
Number of telemedicine visits (reference: 1 visit)	7.32 (1.09-13.54)	**.023**
Percentage of telemedicine visits (reference: 0.5%)	39.1 (1.03-77.11)	**.045**

[a]Boldface *P* values indicate statistical significance ($P < .05$). CI, confidence interval; LSI, limb symmetry index.
[b]Days to achieve >90% LSI for isokinetic quadriceps strength ≈ parameter.

in visits thereafter (Figure 2A). Qualitatively, there was a consistent trend for patients in the postpandemic group to access physical therapy more frequently compared with the control group throughout the course of rehabilitation. Quantitative analysis agreed with the qualitative assessment that the postpandemic group had significantly more total physical therapy visits during the first postoperative year compared with the control group. The median number of physical therapy visits per patient over the course of the first year postoperative was 25.0 (IQR, 20.1-29.9) for the control group compared with 29.5 (IQR, 23.5-35.2) in the postpandemic group ($P = .009$). Given that patients accessed physical therapy more frequently early in their postoperative rehabilitation, a mixed-effects linear regression analysis comparing strength differences within the postpandemic group was performed. Isokinetic strength was not significantly different in patients in the postpandemic group who had surgery closer to the pandemic shutdown (Supplemental Table S1, available separately).

Moreover, the number of in-person physical therapy visits in the control group was 25.8 ± 6.8 compared with 24.4 ± 7.5 in the postpandemic group ($P = .23$). No patient in the control group accessed rehabilitation remotely; however, 66 patients (76.8%) in the postpandemic group had at least 1 RRV. Of those patients who had an RRV in the postpandemic group, the median RRVs for each patient was 4 (range, 2-6). The frequency distribution of RRVs in the postpandemic group throughout the first postoperative year is illustrated in Figure 2B.

A subgroup analysis of the use of RRVs in the postpandemic group was performed to evaluate the association of RRVs and functional outcomes. The Spearman rank correlation was computed to assess the relationship between the number of RRVs and time to achieve quadriceps limb symmetry. There was a positive correlation between the 2 variables, $r = 0.48$ ($P = .015$). In addition, we analyzed whether there was a correlation between the percentage of RRVs and total number of physical therapy visits. When computing the Spearman rank correlation to assess the relationship between the time to achieve quadriceps limb symmetry and the percentage of RRVs, there was again a positive correlation between the 2 variables, $r = 0.41$ ($P = .045$). To estimate the difference in the amount of time delay to achieve quadriceps limb symmetry with an increase number of RRVs, a linear regression was fitted to the data (Table 4). There was a significant increase in the time to achieve quadriceps LSI with an increase in the frequency of RRVs.

DISCUSSION

The COVID-19 pandemic affected many aspects of society, including perioperative health care.[2,18] After ACLR, patients typically attend physical therapy sessions on a weekly or biweekly basis, with orthopaedic surgery follow-up visits occurring at 6 weeks and 3 months postoperatively.[3] The closures and restrictions associated with the COVID-19 pandemic led to rapid changes in the standard of care, including the stoppage of nonessential outpatient visits and the implementation of telemedicine.[1,5,6,9]

In this study, the postpandemic group was found to have lower PT/BW measurements. This is clinically relevant, as quadriceps PT/BW at 60 deg/s is an important predictor of successful progression of functional activities after ACLR.[25] In addition, persistent quadriceps weakness, manifesting as asymmetric strength between the involved and uninvolved limbs, is associated with decreased function and abnormal movements during activities of daily living.[25] This reduction in lower extremity strength in the postpandemic group was also associated with a significantly lower ability to achieve limb symmetry and meet defined functional thresholds at 1 year postoperatively. Achieving the RTS criteria is associated with reductions in injury risk, improved gait patterns, and improved knee contact pressures, whereas functional asymmetries at the time of RTS lead to decreased knee function.[11,13,14,22,25]

Skilled rehabilitation after ACLR completed with either an independent home-based exercise program[12,24] or supervised by a therapist increases the likelihood of a safe RTS.[3,4,7] Therefore, we hypothesized that if the pandemic limited access to orthopaedic care, there would be a reduction in the number of physical therapy contacts. However, there was no difference in the mean number of in-person physical therapy visits per patient between groups. In fact, the use of RRVs in the postpandemic group increased the ability to access rehabilitation compared with the control group.

We found that telehealth increased access to health care postpandemic, and, given the implementation of RRVs, we explored the correlation of RRVs with milestone achievement in the postpandemic group. There was a significant correlation between the number of RRVs and the time to achieve limb symmetry and subsequently achieving the RTS criteria in the postpandemic patient group. These findings suggest that, although RRVs increase access to health care services, their use may be associated with delays in milestone achievement. Because only the postpandemic group used telehealth, there were limited data to adequately compare how RRVs precisely influenced 1-year outcomes. Although further research aimed at optimizing clinician decision-making regarding RRVs after surgery is needed, clinicians may need to identify patients who are delayed in meeting early rehabilitation milestones and prioritize their exercise regime to avoid delays for successful RTS.

Indeed, we found that rehabilitation access did not account for the outcome differences postpandemic, suggesting that external factors likely explain the differences between groups. For example, motivation to return to play is an essential factor in rehabilitation success, and the ability to return to organized sports activities in the postpandemic group was not known postpandemic.[8,27] In addition, the pandemic was associated with an increase in the prevalence of anxiety and depression,[10,31] and mental health significantly affects ACLR outcomes.[27 -31] Moreover, the effects of social isolation, including limited contact with peer group, school, and work place, and customary activities of daily living likely influenced ACLR outcomes.

The findings in the current study vary from those in previously published studies. Lee at al[18] compared International Knee Documentation Committee and Lysholm scores after ACLR in a postpandemic group (surgery between February 1, 2020, and March 31, 2020) and controls (surgery between February 1, 2019, and March 31, 2019) and found no differences in scores between groups. The contrast in results may indicate that a patient's actual strength and function may lag behind their perceived outcomes in subjective questionnaires. Weaver et al[28] examined quadriceps and hamstrings strength in the pediatric/adolescent population at 3 months after ACLR between postpandemic (n = 30) and control (n = 30) cohorts. Similarly, they did not find a significant difference between groups. This may be secondary to differences in ages between our cohorts, as children and adolescents may be more resilient to COVID-19-associated changes. Our findings related to changes in the delivery of health care were corroborated by Lee et al,[18] who found no RRVs in the control cohort and a significant increase in the postpandemic group, with almost 70% of patients having at least 1 RRV.

Limitations

Among the limitations of the current study, data representing socioeconomic status, gymnasium accessibility, and the mental health status of patients were not available. Therefore, the effects of each of these parameters on ACLR could not be determined. In addition, compliance with the physical therapy protocol was not available and could have been a factor in a person's ability to progress in rehabilitation. However, given the similarity with the number of in-person physical therapy visits between groups and the robust amount of data, it is unlikely that compliance significantly influenced the resultant differences.

CONCLUSION

The COVID-19 pandemic was associated with a significant decrease in lower extremity strength and a lower probability of achieving limb symmetry and passing RTS criteria at 1 year after ACLR. These results were not due to lack of access to physical therapy.

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