

Effect of COVID-19 Pandemic on Rehabilitation after Anterior Cruciate Ligament Reconstruction

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Abstract:

Objective: The aim of this study was to study the impact of COVID-19 related lockdown and practice of social distancing on post-operative rehabilitation in patients after ACL reconstruction taking into account the impact on postoperative recovery, kind of rehabilitation being performed, equipments and facilities which were available for rehabilitation.

Methods: In this questionnaire based study, every patient who had undergone ACL reconstruction from May 2019 to October 2019 was categorized in control group (pre- COVID group) and patient who had undergone ACL reconstruction from March 2020 to August 2020 was considered in COVID-group. Questions regarding the utilization of health care professionals for rehabilitation management and the mode of service delivery (face-to-face or tele-health), regarding the type and frequency of rehabilitation exercises being performed as well as the facilities and equipment available for rehabilitation, and regarding the effect of COVID-19 on their recovery.

Results: Most patients in control group (86%) maintained face-to-face rehabilitation whereas this figure significantly dropped in patients studied in 2020. Near about one- third of the surveyed patients during COVID-19 period thought that it would delay their return to sporting activities Patients were minimally concerned about access to supervised rehabilitation and knee reinjury, but they were concerned about access to equipment.

Conclusion: Patients who had ACL reconstruction before COVID-19 pandemic were able to maintain face-face contact with their health professional for physiotherapy. Patients operated during COVID-19 pandemic felt that the social distancing and restrictions ultimately led to delayed return to sporting activities.

Keywords: Coronavirus; pandemic; rehabilitation; knee injury; anterior cruciate ligament.

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Introduction

The World Health Organization declared a pandemic by coronavirus disease-19(COVID- 19 on 12 March, 2020 [1]. This pandemic has remarkably affected the national health care system and imposed burdens on the economy at large [2]. Countries across the globe practiced strict lockdown and started promoting social distancing, use of hand sanitizers and use of masks [3]. The government of India also enforced a strict nationwide lockdown from 25thMarch, 2020 till 14thApril 2020 (Phase-1) which was later extended till 3rdMay 2020 (Phase-2). Due to shutdown of elective procedures in every specialty in hospital including Orthopaedics and Sports medicine, financial burden started to pile up on hospitals nationwide. Arthroscopic procedures were no exception to this.

Anterior cruciate ligament (ACL) provides rotational stability to knee in transverse and frontal planes and act as primary passive restraint to anterior translation of the tibia on the femur [4,5]. ACL

rupture is a common injury of knee that generally occurs during sporting activities. Ligamentous injuries are a major cause of morbidity in athletes [6]. Incidence of osteoarthritis (OA) increases to approximately 10-20% after an ACL tears [7]. The most common option of treatment is reconstruction surgery. After the surgery, patients usually undergo a period of supervised rehabilitation, which starts in the early postoperative period for optimal outcomes [8]. COVID-19 pandemic related social distancing led to a situation that has never been experienced by the modern world and it ultimately resulted in limited access to rehabilitation facilities.

Rehabilitation after ACL reconstruction has been widely studied, but there is no proper consensus whether supervised hospital based therapy is comparable to home-based rehabilitation [9-11]. This unique situation led to an opportunity to evaluate the effectiveness, the consequences and challenges related to home based postoperative rehabilitation.

The aim of this study was to study the impact of COVID-19 related lockdown and practice of social distancing on post-operative rehabilitation in patients after ACL reconstruction taking into account the impact on postoperative recovery, kind of rehabilitation being performed, equipments and facilities which were available for rehabilitation.

Material and Methods

Study design and patients: This questionnaire based study was performed at tertiary trauma center in India. Every patient who had undergone ACL reconstruction from May 2019 to October 2019 was categorized in control group (pre-COVID group) and patient who had undergone ACL reconstruction from March 2020 to August 2020 was considered in COVID-group. The limit of control group time frame was set considering that the rehabilitation protocol did not overlap with COVID-group patients. All operations were performed by specialist orthopaedic knee surgeons. The identical postoperative rehabilitation protocol had been provided to all patients, although individuals undertook their rehabilitation under supervision at their discretion.

Rehabilitation protocol: The goals outlined in early phases of rehabilitation are important in directing patient return to function. Aim of this phase is not only to protect repaired ligament but to prepare the patient for next phase of rehabilitation by restoring range of motion, starting quadriceps exercises and resolving joint effusion.

Post-operative patient put in hinged knee brace 0-90° of knee flexion-extension for 6 weeks. Patient allowed partial weight bearing with gradual return to Full weight bearing at 2 weeks following surgery crutches may be discontinued when patient gait is no more an antalgic gait. Role of early range of motion after surgery is reducing post op complications and gain strength of muscles and prevent quadriceps atrophy. Running was permitted once there were no clinical signs of knee effusion and quadriceps strength was adequate, typically from

12 to 16 weeks postoperatively. Gym based program is started at 10 week post-surgery or supervised training with coach. Sport specific skill acquisition started at 6 months if quadriceps strength is suitable. Return to competition sport was permitted after a minimum of 1 month of unrestricted full-contact training, typically from 11 to 12 months after surgery.

Study Tool: An online questionnaire was used. The questionnaire was developed using Google forms. Questions regarding the utilization of health care professionals for rehabilitation management and the mode of service delivery (face-to-face or tele-health), regarding the type and frequency of rehabilitation exercises being performed as well as the facilities and equipment available for rehabilitation, and regarding the effect of COVID-19 on their recovery. The questionnaire was sent to each patient by sharing web links via email or messenger.

Data and Statistical Analysis: Frequency statistics were conducted to present utilization of health care, type and frequency of rehabilitation exercises being performed, the range of accessible equipment for rehabilitation. A subgroup analysis was performed to look at survey responses according to differences within the time that had elapsed since surgery (i.e. patients who had ACL reconstruction during the pre COVID era vs the COVID group). Other subgroup analysis included patients' age, sex, and number of prior ACL injuries. Continuous variables were compared with the Student t test or Mann-Whitney test. The w2 test was used to compare categorical variables. Statistical significance was set at $P < .05$. Data analysis was carried out using SPSS Version 25.0 (IBM Corp).

Results

Higher number of patients was observed in control group (Table 1). Patients reported having a range of equipment available to them for their rehabilitation, with resistance bands, dumbbells, and Barbells being the most used in both groups (Table 2).

Table 1: Demographic Data

Variables	May 2019 – October 2019	March 2020 – August 2020
Total	164	71
Male	91 (55.4%)	38 (53.5%)
Female	73 (44.6%)	33 (46.5%)

Table 2: Equipment Used During Rehabilitation

Equipment used	May 2019 2019 (%)	–	October	March 2020 August 2020 (%)	–	P-value (<0.05)
Home setup/facility	41 (25)			28 (39.4)		No
Resistance bands	93 (57)			47 (66.1)		No
Barbells	71 (43.2)			29 (40.8)		No
Dumbbells	102 (62.1)			39 (54.9)		No
Balance ball	67 (40.8)			26 (36.6)		No

Treadmill	99 (60.3)	16 (22.5)	Yes
Cross-trainer	81 (49.3)	11 (15.4)	Yes

Regarding the impact of pandemic and isolation policies on recovery, near about one- third of the surveyed patients during COVID-19 period thought that it would delay their return to sporting activities (Table 3). There were no significant differences between patients for whom this was their first ACL reconstruction and those who had undergone prior ACL surgery.

Table 3: Patient-Reported Impact of COVID-19 Restrictions on Overall Recovery

Mode of services availed and related experience	May 2019 – October 2019 (%)	March 2020 – August 2020 (%)	P-value (<0.05)
Telehealth	17 (10.3)	24 (33.8)	Yes
Face to face	142 (86.5)	36 (50.7)	Yes
Neither face to face nor Telehealth	5 (3.04)	11 (15.4)	Yes
faster recovery than expected	18 (10.9)	3 (4.2)	No
Delayed return to sport	26 (15.8)	22 (30.9)	Yes

Table 4: Questionnaire

Questionnaire
Q1- Do you have home gym setup/facility?
Yes/No
Q2- Did you use resistance bands during the rehabilitation period?
Yes/No
Q3- Did you use barbells during the rehabilitation period?
Yes/No
Q4- Did you use dumbbells during the rehabilitation period?
Yes/No
Q5- Did you use balance ball during the rehabilitation period?
Yes/No
Q6- Did you use treadmill machine during the rehabilitation period?
Yes/No
Q7- Did you use cross trainer machine during the rehabilitation period?
Yes/No
Q8- what services did you utilize to interact with health care professionals during rehabilitation phase?
Telehealth/ face to face interaction/ None
Q9- Do you think you have recovered earlier than expected?
Yes/No
Q10- Do you think your return to sporting activities has been delayed?
Yes/ No

Discussion

The COVID-19 pandemic has led to a nationwide decrease in interest in sports medicine and surgery. Due to strict lockdown imposed by the government, hospitals have seen a slump in patient turnover. It was somewhat to a surprise that most patients were receiving in-person (face-to-face) contact, as social distancing rules had been implemented and telehealth was advised.

However, the timing of the survey was during the various phases of lockdown, and most people received in-person consultation in the COVID-19 group at later stages when restricted face-to-face treatment was still permitted. Therefore, patients and therapists may have perceived the danger of COVID- 19 transmission related to in-person supervised therapy to be minimal at that point. This finding may equally highlight the high regard and

importance that patients placed on receiving supervised therapy. As stated earlier, the survey was conducted during phases of the pandemic, it is possible that the availability of telehealth services may have been limited, and that we asked patients only what services they used instead of what was offered. It would have been interesting to examine whether the use of telehealth services increased during strict restrictions, when face-to-face services were extremely limited. However, this could not be evaluated as ACL reconstruction also ceased during this stage owing to its classification as non-urgent and compounded by the lack of individual participating in sport, similar to the surgical reductions seen in other countries [12]. A recent meta-analysis reviewed patient and surgeon satisfaction with telehealth in orthopaedic care and concluded that its use resulted in satisfaction and patient-reported measures of pain and function comparable to in-

person assessments [13]. Patients additionally noted considerable time savings. As such there may be a role for telehealth to become a regular feature of rehabilitation practices, and future work should capture good outcomes, including complications, to ensure that patient care is not compromised.

Comparable percentage of patients used dumbbell, barbell, and resistance bands for their rehabilitation as these equipments are relatively cheaper and are frequently used by people at home whereas machines like treadmill and cross trainers are quite costly and people mostly visit gymnasiums to use them. Patients' greatest concern was a lack of access to equipment for rehabilitation, which isn't surprising as gymnasiums was required to shut (14). So a significant difference was seen in both groups regarding treadmill and cross trainer (p -value < 0.05). Perhaps as an effect of this, most of the patients believed that the COVID-19 restrictions would lead to delay in their recovery because their rehabilitation was progressing at a slower rate than normal. A notable portion (60%) of the patient cohort had COVID-19-related changes to their employment, like working from home, reduction of hours, or no longer working (on leave or unemployed). This likely had positive and negative ramifications. Working from home may have given greater time and opportunity to undertake rehabilitation. However, working from home has been associated with a greater time spent in sedentary behaviors (sitting and screen time) [15].

The limitations of this work include the geographically specific nature of the COVID-19 restrictions that were imposed, and it is not clear how generalized the current findings are to other settings. All collected data was self-reported, and while patients were responding to their current situations and the response options have been straight forward to answer, no accuracy checks could be made. Finally, the COVID-19 situation was continually evolving and changing, often regularly, throughout the period of data collection, and it is unknown how this may have affected patients' responses and views.

Conclusion

Patients who had ACL reconstruction before the COVID-19 pandemic were able to maintain face-face contact with their health professional for physiotherapy. Telehealth consultation was not extensively used at this time. Patients' greatest concern was a lack of access to equipment for pandemic felt that the social distancing and restrictions ultimately led to delayed return to sporting activities.

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