

## Factors Affecting Return to Sports After Anterior Cruciate Ligament Reconstruction in Young Athletes at A Tertiary Care Hospital in Pakistan

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### ABSTRACT

**Objective:** To look for the factors associated with return to sports after anterior cruciate ligament reconstruction in young athletes at a tertiary care hospital in Pakistan.

**Study Design:** Prospective longitudinal study.

**Place and Duration of Study:** Department of Orthopaedic Surgery, Combined Military Hospital, Lahore Pakistan from Jul 2020 to Jun 2023.

**Methodology:** We included all the young athletes who underwent anterior cruciate ligament reconstruction. Patients were followed for three months. The anterior drawer test and Pivot shift test were used to assess the study participants for ligamentization of the reconstructed anterior cruciate ligament. Relevant socio-demographic and clinical factors were associated with non-return to sports in patients at the end of three months.

**Results:** A total of 121 patients with ACL repair were recruited for this study. The mean age of the study participants was 28.20±6.73 years. After three months, 49(40.4%) patients did not return to sports, while 72(59.5%) did. Statistical analysis revealed that high body mass index, psychiatric morbidity, and not undergoing regular physiotherapy were statistically significantly associated with non-return to sports ( $p$ -value <0.005).

**Conclusion:** Non-return to sports was not an uncommon finding in our study participants at the end of three months. The presence of high body mass index, psychiatric morbidity, and not undergoing regular physiotherapy were the factors associated with non-return to sports in young athletes after anterior cruciate ligament reconstruction at the end of three months.

**Keywords:** Anterior cruciate ligament reconstruction, Anterior drawer test, Pivot shift test, Sports.

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### INTRODUCTION

The femur and Tibia are two long bones of the lower limb that are connected via a strong band of tissue labeled as the Anterior cruciate ligament (ACL). Sports injuries have been notorious for damaging this ligament and weakening the connection between two long bones of the body. All commonly played sports may be prone to the individual towards injury of this important ligament in the lower limb.<sup>1,2</sup> A popping sensation, pain, and swelling may occur after an ACL injury, which may predispose the individual to partial disability and compromise the overall quality of life.<sup>3</sup>

The diagnosis of an ACL tear is typically made by the orthopedic team, which incorporates both clinical and radiological findings.<sup>4</sup> Surgical management is usually the treatment of choice in most patients. Multiple clinical tests along with an MRI of the affected joint are used to assess the recovery in these

patients after the surgical management, and only then does the team decide that the return to sports option would be offered to the patient at this point of time or not.<sup>5</sup> If team is not convinced after radiological and clinical tests, return to sports may be delayed for few weeks or months.<sup>6</sup>

Orthopedic, trauma, and sports physicians have been seeking factors associated with delayed return to sports in athletes undergoing ACL repair. One study covered this phenomenon extensively and attempted to develop a SPORTS score at 6 and 12 months to facilitate treating teams in making accurate decisions regarding return to sports in athletes undergoing ACL repair.<sup>7</sup> Lai *et al.*, (2018) published a systematic review and meta-analysis that included studies with long-term follow-up of patients who underwent ACL reconstruction. It was revealed that around 83% of patients eventually returned to sports after ACL repair.<sup>8</sup> Patel *et al.*, (2019) studied 78 patients who underwent ACL repair and attempted to identify the factors associated with return to sports. They concluded that activity level after the surgery and

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psychosocial factors affected the time to return to sports in these individuals.<sup>9</sup>

Sports are usually played in streets or private setups that are not fully equipped to cater to health-related safety measures. Military training activities and sports are also common in several institutes in our country; therefore, many people may be at a high risk of developing ACL injuries. A recent local study published by Khan *et al.*, evaluated the functional outcomes of patients who underwent ACL repair at a tertiary care hospital in Peshawar.<sup>10</sup> Limited local data have been available regarding the number of individuals returning to sports after surgery and the factors affecting this outcome. We, therefore, planned this study with the rationale of identifying factors associated with return to sports after anterior cruciate ligament reconstruction in young athletes at a tertiary care hospital in Pakistan.

### METHODOLOGY

The prospective longitudinal study was conducted at Orthopaedic Department, Combined Military Hospital, Lahore from July 2020 to June 2023. The sample size was calculated using the WHO sample size calculator, with a population prevalence proportion of return to sports after ACL repair set at 59% and a margin of error of 10%.<sup>11</sup> A non-probability consecutive sampling technique was employed to gather the sample.

**Inclusion Criteria:** Sportsmen or athletes or military personnel between the ages of 18 and 45 years undergoing arthroscopic ligamentous reconstruction of the anterior cruciate ligament were included.

**Exclusion Criteria:** Patients who were not athletes or military personnel were not recruited. Patients who have poly-trauma or other injuries of the lower limb in addition to ACL injury were also not enrolled in the study. Those with any malignant or benign lesions of the lower limb or those who lost follow-up after surgery were also excluded from the study. Those who experienced any complications after the surgery or underwent redo surgery were also excluded.

Ethical approval was obtained from the Institutional Review Board Committee of CMH Lahore via letter number 474/2023. The research team recruited the sample population after applying the inclusion and exclusion criteria set for the study. The orthopedics team did ACL reconstruction via standard method under spinal anesthesia.<sup>12</sup> After the surgery, patients were kept in the recovery room for three

hours and then shifted to the high-dependency unit for 24 hours and later shifted to the orthopedics ward. Patients with postoperative complications were screened and excluded from the study here. All other Patients were given a physiotherapy and follow-up plan. They were followed up for three months after the surgery to look for outcomes. Anterior drawer and Pivot shift tests were used to assess the joint's stability. Anterior-posterior side-to-side difference of less than 5mm and a negative pivot shift test was used to class the joint as stable and recommend the patient for return to sports.<sup>13</sup> Psychiatric Morbidity was diagnosed if patients score more than three on General Health Questionnaire-Twelve.<sup>14</sup> Patients were classed as normal, overweight and obese with regards to their BMI on the set standards of world health organization.<sup>15</sup>

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS 23.0). The mean and standard deviation were calculated for the age of the athletes undergoing ACL repair. Frequency and percentages were calculated for patients who returned to sports, along with other qualitative variables. Pearson chi-square and Fisher exact tests were applied to examine the association between profession, body mass index, psychiatric morbidity, and engagement in physiotherapy and non-return to sports at the end of three months in our study participants. The *p*-value less than or equal to 0.05 was considered significant to establish the association.

### RESULTS

One hundred twenty-one patients undergoing ACL repair were recruited for this study. The mean age of the study participants was 28.20±6.73 years. Table-I summarizes the basic social and clinical characteristics of sportspeople/athletes included in the study. After three months, when anterior drawer and pivot shift tests were performed, 49(40.4%) patients did not return to sports, while 72(59.5%) did. Out of the total study participants, 98(80.9%) had a normal BMI, 18(14.8%) were classified as overweight, and 5(4.1%) participants were obese.

Table-II shows the results of the Statistical analysis. It was revealed that a high body mass index (*p*-value=0.008), psychiatric morbidity (*p*-value=0.001), and not undergoing regular physiotherapy (*p*-value<0.001) were statistically significantly associated with non-return to sports at the end of three months. The profession of the study participants (*p*-value=0.635)

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was not statistically significantly associated with non-return to sports at the end of three months in our study.

**Table-I: Demographic and Clinical Profile of Patients Recruited in the Study (n=121)**

Parameters	n(%)
<b>Age (years)</b>	
Mean±SD	28.20±6.73 years
<b>Profession</b>	
Military	104(85.9%)
Civilians	17(14.1%)
<b>Return to sports after three months</b>	
No	49(40.4%)
Yes	72(59.5%)
<b>Body mass index</b>	
Normal	98(80.9%)
Overweight	18(14.8%)
Obese	05(4.1%)
<b>Causes of Anterior Cruciate Ligament (ACL) Tear</b>	
Injury during assault course	55(45.5%)
Kabaddi	27(22.3%)
Sports	17(14%)
Trauma	16(13.2%)
Others	6(5%)

**Table-II: Association of Various Factors with Non-return to Sports at the end of Three Months of Anterior Cruciate Ligament (ACL) Repair (n=121)**

Factors studied	Return to Sports at the end of three months n=72	Non-Return to Sports at the end of three months n=49	p-value
<b>Psychiatric morbidity</b>			
No	59(81.9%)	26(53.1%)	0.001
Yes	13(18.1%)	23(46.9%)	
<b>Profession</b>			
Military	61(84.7%)	43(87.7%)	0.635
Civilian	11(15.3%)	06(12.3%)	
<b>Engagement in Physiotherapy</b>			
No	19(26.4%)	29(59.1%)	<0.001
Yes	53(73.6%)	20(40.9%)	
<b>Body Mass Index</b>			
Normal	64(88.9%)	34(69.4%)	0.008
Overweight	08(11.1%)	15(30.6%)	
t or obese			

### DISCUSSION

More than half of the injuries occurring in and around the knee joint involve ACL. Athletes and sportspeople are more likely to encounter these injuries than the general population. Treatment involves ligamentous reconstruction of the ACL using a variety of techniques and graft choices, thereby enhancing the rotational stability of the knee joint, which allows patients to return to their pre-injury

level of function. Sports are a significant part of the lives of most patients who suffer from these injuries; therefore, a significant landmark in recovery is their return to sports. We conducted this study to identify factors associated with return to sports after anterior cruciate ligament reconstruction in young athletes managed by our team over the last three years.

Bauer et al. published a study on factors associated with returning to sports after ACL surgery. They concluded that fear of re-injury, lack of motivation, and other psychosocial factors were significantly associated with non-return to play after ACL reconstruction.<sup>16</sup> We did not study psychosocial factors in detail. However, lack of engagement in physiotherapy and the presence of psychiatric morbidity were the factors associated with non-return to sports after three months of surgery.

A study published in the USA in 2022 analyzed the return to sports of athletes after ACL repair. It was revealed that the age of the athlete and level of activity were associated with a return to sports after the ACL reconstruction.<sup>17</sup> Non-return to sports was not an uncommon finding in our study participants at the end of three months. The presence of high body mass index, psychiatric morbidity, and not undergoing regular physiotherapy were the factors associated with non-return to sports in young athletes after anterior cruciate ligament reconstruction at the end of three months.

Mukarami *et al.* targeted the Japanese population to identify parameters that could aid in the early return to sports after ACL repair. They concluded that quadriceps strength was a factor positively associated with early return to sports after ACL repair.<sup>18</sup> Although we did not directly assess quadriceps strength, regular physiotherapy was associated with early return to sports in our study participants.

A qualitative assessment of psychological and social determinants of early return to sports after ACL repair was done by Burland et al. in 2018. The authors found that hesitancy, lack of confidence, and fear of reinjury were the factors associated with non-return to sports in their study participants.<sup>19</sup> We did a quantitative study and found out that psychiatric morbidity influenced return to sports along with regular physiotherapy and BMI.

### LIMITATIONS OF STUDY

Multiple confounding factors can affect the return to sports in athletes after ACL repair; therefore, it cannot be

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assumed that factors significantly associated with non-return also cause non-return to sports. Strict control of confounding factors and analysis of daily routine after surgery in all individuals may address this limitation. Moreover, a screening tool was used to assess psychiatric morbidity on which symptoms may be under or over-rated.

## CONCLUSION

Non-return to sports was not an uncommon finding in our study participants at the end of three months. The presence of high body mass index, psychiatric morbidity, and not undergoing regular physiotherapy were the factors associated with non-return to sports in young athletes after anterior cruciate ligament reconstruction at the end of three months.

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## Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

SM & WM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SW & AR: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

HR & ATM: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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