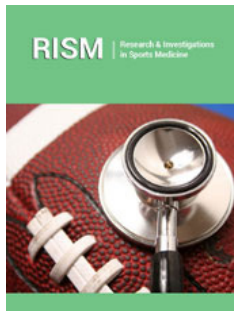


# Anterior Cruciate Ligament Injury in Soccer Players: Challenges, Prospect and Prevention

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## Abstract

Anterior cruciate ligament injury in soccer players is an important knee pathology that requires great understanding by the treating surgeon because of how it can psychologically affect the health of the injured athlete. Majority of these injuries will occur in young adults with female's athletes having a higher risk than males. Risk factors can either be modifiable or non-modifiable and diagnostic accuracy of Lever sign in the evaluation of the injured athlete is higher than the traditional ones. This injury can be managed surgically and non-surgically and while available evidence suggests that most treating surgeon tilts towards surgical, the available literature is not decisive on which is superior between the two options of care and hence the current trend is to present all available evidences to the injured athlete so that such athlete can make an informed decision. Anterior cruciate ligament injury is preventable and most injured athletes will return to play whether they are managed operatively or non-operatively.

**Keywords:** Anterior cruciate ligament; Soccer; Disease management; Prevention

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## Introduction

Anterior Cruciate Ligament Injury (ACLI) in soccer players is an important knee pathology that requires great understanding by the treating surgeon because of how it can psychologically affect the health of the injured athlete. It cost thousands of dollars to treat and despite the most effective treatment, 65% of the affected athlete may never return to play [1,2]. The aim of this mini-review is to discuss the current literature regarding epidemiology, risk factors, treatment and prevention of anterior cruciate ligament injuries in soccer players.

## Epidemiology

According to recently published data from two professional leagues, the incidence of ACLI is 0.040 to 0.414 per 1000 hours of play and usually average incidence per team per season is 0.26 to 0.53 [3,4]. The average age is around 26yrs of age [3] and it is widely reported that female athletes have a higher risk than their male counterpart sometimes as high as eight-fold increased risk in female soccer players [5]. ACLI can result due to either contact or non-contact injuries with non-contact injuries constituting majority of the cases, approximately 90% [6].

## Risk factors

The risk factors responsible for ACLI can broadly be divided into two groups: modifiable risk factors and non-modifiable risk factors. The non-modifiable risk factors are Q-angle, narrow inter-condylar notch, A-shaped inter-condylar notch, subtalar joint overpronation, knee hyperextension and joint laxity which is commoner in female athlete and may explain the increased risk in the female gender. Other non-modifiable risk factors are genetic predisposition, female gender, previous ACLI, size of the anterior cruciate ligament, hormonal factors and kinematics like the knee abduction angles. The modifiable risk factors are weather conditions, characteristics of the pitch, playing on natural or artificial grass, type of football

shoe and high body mass index. Three important things are noteworthy: [1] Majority of these factors are pronounced in the female athletes [2] Among all these factors, only the Q-angle, joint laxity and knee hyperextension have been found as very important in ACLI [3] Other risk factors require further research [7,8].

### Clinical evaluation

An anterior cruciate ligament injured patient is likely to give a history of sudden deceleration, jumping and cutting man oeuvres resulting in a "pop" like sensation [9]. Traditional clinical examination tests for diagnosing ACLI are anterior drawer test, the Pivot shift test and Lachman test and while previous literature will suggest Lachman test as having the most diagnostic accuracy in the evaluation of ACLI [10], most recent literature suggest otherwise. Sokal and colleagues revealed in their most recent publication that the diagnostic accuracy of Lachman test appear overestimated in previous literature and revealed in their findings that both the pivot shift test and the Lever sign are the overall best test for clinical diagnosis of ACLI [11]. The Lever sign is a new clinical test introduced in human subjects by Lelli and colleagues [12] in unique cases of ACLI where the Lachman test is difficult to perform and recent findings shows that it has higher diagnostic accuracy compared to usual traditional tests [13]. While there are features on clinical radiographs such as Second fracture and fracture of the tibial eminence, that may suggest ACLI, most cases of ACLI are featureless on clinical radiographs and hence the imaging modality for accurately diagnosing ACLI and other secondary injuries still remain the MRI [9].

### Treatment

Generally, treatment of ACLI can either be non-operative through structured rehabilitative protocol or operative through Anterior Cruciate Ligament Repair/Reconstruction (ACLR) and numerous evidence suggest that there is usually no difference in the long-term outcomes between the two modalities of treatment [14]. It should however be noted that eventually some of the patients initially managed non-operatively through structured rehabilitative protocol will require delay ACLR due to persistent knee laxity and functional instability and the current evidence from literature still suggests no difference in clinical outcomes between this group of patients and those who had acute ACLR [15,16]. Another area of concern to both the treating surgeon and the patients is how the outcome differs between patients undergoing structured rehabilitative protocol only and those undergoing delayed ACLR after a period of rehabilitation. A recent pragmatic Randomized Control Trial (RCT) showed that patients who had rehabilitation plus delayed ACLR had superior clinical outcomes compared to patients who only had structured rehabilitative protocol alone [17].

Considering these available evidences, both the injured soccer player and the treating physician may be faced with the challenge of deciding which treatment option is best for a particular patient. Recently, American Academy of Orthopedic Surgeon released a practice guideline for treating ACLI though it primarily focused

on surgical intervention [18]. Therefore, the recommendations of Filbay and Grindem [19] is suggested in reaching a treatment decision for a particular injured soccer player: factors such as concomitant injury, accessibility to care, patient preferences and life plans should be taking into consideration and the advantages and disadvantages of each treatment options should be discussed with the patient to help in making an informed decision [19]. In patients who are to be surgically treated, there is no difference in the clinical outcome between use of single or double bundle reconstruction though single bundle is cheaper, autograft is preferred to allograft, and either bone-patellar-bone autograft (BTB) or hamstring autograft can be used for the reconstruction [18].

### Prevention

Considering the impact and economic burden of managing ACLI, there has been effort at instituting ACLI prevention program which from available evidence has largely been successful. Most of the ACLI injury prevention program are mostly exercise based program which can either be single component or multiple component exercise-based program. Multiple component exercise-based program is commoner than their single component program and example of such programs include FIFA 11+, Prevent injury and Enhance Performance Programme (PEP), Knäkontroll program and Footy First [20]. The result of a meta-analyzed meta-analysis performed by Webster and Hewett [21] showed the ACLI prevention program reduces the risk of ACLI as much as 50% suggesting that these interventions are largely effective and should be recommended for soccer players. While all these prevention programs have been shown to reduce risk of ACLI, a recent network meta-analysis that compared all these interventions and ranked them according to a probability score showed that FIFA 11+ is the most effective ACLI prevention program though the author suggest caution in the interpretation of the result due to low number of studies and the high risk of bias of most included studies.

### Return to play

Athletes are usually concerned about when they are likely to return to play after ACLI and literature review shows that the answers to this pertinent question depends on some factors [22]. Majority of the available literature on return to play following ACLI are based on ACLR and according to Manojlovic et al in their recent publication, 72% of soccer players who sustain ACLI will return to play. While there are few literatures regarding return to play following non-operative management of ACLI, it has been noted that a higher percentage of athletes managed conservatively will equally return to play [23]. Susan KL et al. [24] compared rate of return to play with stability and strength between ACLI injured athletes who had ACLR and those who were managed non-operatively and found that ACLR was only superior to non-operative care of ACLI in competitive pivoting sports. Otherwise, both groups were comparable in the rate of return to play and functional outcome. They however also noted that those patients who undergo ACLR and who are also involved in competitive pivoting sports are likely to sustain subsequent injuries.

## Conclusion

Anterior cruciate ligament injury is common among soccer players especially female soccer players and magnetic resonance image is important in the diagnostic work-up. The management should be patterned to individual patients and it is advised that injury prevention program should be instituted early for these athletes to reduce the risk of Anterior cruciate ligament injury in this group of patients.

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