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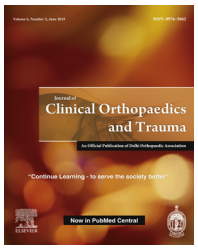

Original Article

Acute anterior cruciate ligament injuries in multisport elite players: Demography, association, and pattern in different sports

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ARTICLE INFO

Article history:
Received 1 February 2016
Accepted 26 March 2016
Available online 5 April 2016

Keywords:
ACL injury
Sports injuries
Knee
Meniscal tear
Chondral damage

ABSTRACT

Background: Anterior cruciate ligament (ACL) tear rates are known to vary from sport to sport. To the best of our knowledge, the relationship of ACL injury with different sports is not reported earlier. The objective of the present study is to investigate the association of ACL injury with different sports and to document various associated ligamentous, meniscal, and chondral lesions of the knee.

Materials and methods: Descriptive epidemiological study was carried out in a tertiary care center over a 10-year period. Data were collected of the 638 ACL injured elite sportspersons operated by us. Percentage of ACL injuries and other associated injuries of the knee in different games was calculated. Chi-square test was applied to analyze the relationship between injuries of the specific structures of knee and sports played. p values less than 0.05 were considered to be statistically significant with a confidence interval of 95%.

Results: Kabaddi and football constituted the highest percentage (61%) of ACL injuries. Associated injuries were 10 posterior cruciate ligament tears, 11 posterolateral corner injuries, three medial collateral ligament tears, 390 meniscal tears (206 medial, 184 lateral), 201 femoral/tibial condylar lesions (128 medial, 40 lateral femoral condyle and 17 medial, 16 lateral tibial condyle), and two common peroneal nerve injuries. Lateral meniscal tears in kabaddi and medial femoral condylar lesions in badminton were significantly higher.

Conclusions: Kabaddi resulted in higher number of ACL injuries and other associated injuries to the knee. Further investigation is required to ascertain high-risk factors for such injuries.

1. Introduction

Anterior cruciate ligament (ACL) injuries of the knee are commonly seen injuries in various contact sports – kabaddi, football, basketball, handball, wrestling, hockey, and noncontact sports, such as badminton, cricket, gymnastics, and volleyball.[1–5] The incidence and pattern of the ACL injury vary with the type of sports activity, age, and gender.[6–10] Continuation of sports activity in the presence of ACL injury predisposes

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http://dx.doi.org/10.1016/j.jcot.2016.03.005
0976-5662/

for secondary injury to the intra-articular structures of the knee.[11]

Some studies have reported the incidence and prevalence of knee injuries in different sports without mention of specific structures in the knee joint.[12–15] Others have focused on the incidence and rate of ACL injury in individual sports and a few on the comparison between two or more sports.[16–20] Most of the previous studies have reported on the overall occurrence of the meniscal and chondral injuries of the knee associated with the ACL injury and a few on the sports-specific meniscal injuries associated with ACL tears.[21–23] Till date, only four epidemiological studies have presented specific data about the incidence and pattern of the ACL injury in multiple sports activities.[4,7,23,24]

However, in the current literature, we were unable to find any study that has analyzed the cohort of ACL injured sportspersons to ascertain the relationship of ACL injury as well as injury of the internal structures of the knee joint in various sports.

The purpose of our study was to investigate the association of ACL injury with different sports in general, and more specifically to study the occurrence of various ligamentous, meniscal, chondral, and neurovascular lesions of the knee in ACL injured knees in various sports, so that the severity of knee injury in specific sports could be ascertained.

2. Materials and methods

This is a prospective study carried out in a tertiary care center over a period of 10 years from January 2005 to April 2015. We included all the patients attending our sports injury clinic for ACL reconstructive surgery. The demographic data of all the patients, type of sport played by them, and intraoperative findings were recorded in a predesigned pro forma.

We included all the patients who presented between 1 and 42 days (6 weeks) of the ACL injury and excluded those injuries that occurred apart from any sporting activity and patients who reported after a delay of 42 days. We performed a detailed clinical examination regarding pain, swelling, range of motion, and specific tests – anterior drawer test, pivot shift test, and Lachman test. MRI was done in all the patients. Quantitative assessment was done using KT-1000 knee arthrometer to document the level of instability. Data were then analyzed using SPSS version 17.0. Mean age of the patients and percentage of all ACL injuries and associated injuries of the knee in different sports were calculated. Chi-square test was then applied to analyze the relationship between different sports played, resulting in ACL injury and the associated injuries of the knee. For comparing the association of the associating injuries in different sports, we separately analyzed the data for eight sports and excluded all those sports with ACL injuries less than 15 in number.

3. Results

The total number of patients was 638. Average time from injury (TFI) was 24 days. Age of the patients varied from 13 to 41 years (mean age 24.9 ± 5.7 years). All the sports participants were elite athletes. Out of 638 players, 449 (70.4%) were in the age group of 18–27 years. There were 600 (94%) ACL tears in males as compared to 38 (6%) in females. Left knee, 365 patients (57.2%), sustained more injuries as compared to the right knee, 273 patients (42.8%).

Kabaddi accounted for the highest number of ACL injuries, 285 patients (44.7%), followed by other sports (Tables 1 and 2). The mean value of side-to-side difference of KT-1000 was highest in kabaddi (mean 7.2 mm, range 6–9 mm). In the rest of the games, the mean difference was 6.5 mm (range 5–7 mm).

Other associated injuries, which have accompanied ACL injuries, were as follows: 10 (1.6%) posterior cruciate ligament (PCL) tears, three (0.5%) medial collateral ligament (MCL) tears (grade 3), 11 (1.7%) complete posterolateral corner (PLC) injuries, and two (0.31%) complete common peroneal nerve (CPN) palsies. These associated injuries were diagnosed on the basis of clinical examination and MRI. The PCL and PLC injuries were managed by performing respective reconstructive surgeries at the time of ACL reconstruction only. Both the peroneal nerve palsies were seen in the patients suffering from PLC injuries and the peroneal nerve neurolysis was done at the time of PLC reconstruction. Of these, one patient showed complete recovery while the other patient required a subsequent tibialis posterior tendon transfer. The MCL injuries showed full recovery with a hinged brace for 6 weeks after ACL reconstruction. A total of 390 (61.1%) meniscal tears were seen, out of which, 206 (32.3%) were medial meniscal tears and 184 (28.8%) lateral meniscal tears; no statistical significant difference was found between medial and lateral meniscal tears ($\chi^2 = 1.79$, df = 1, $p = .18$). 201 (31.5%) chondral lesions of the femoral/tibial condyles were observed. Chondral damage of the medial femoral condyle was seen in 128 (20.1%) patients and lateral femoral condyle in 40 (6.3%) patients. The difference between medial and lateral condylar chondral damage was found to be highly statistically significant ($\chi^2 = 53.08$, df = 1, $p = .0001$). Chondral damage of the medial tibial condyle was seen in 17 (2.7%) patients and lateral tibial condyle in 16 (2.5%) patients; the difference was not statistically significant ($\chi^2 = 0.031$, df = 1, $p = .86$).

When eight sports (Table 3) with ACL injuries more than 15 in number were analyzed, kabaddi players were found to suffer the highest percentage of lateral meniscal tears (36.5%), which was statistically significant ($\chi^2 = 15.89$, df = 7, $p = .026$). The chondral damage of the medial femoral condyle was observed to be the maximum in the badminton players (29.4%), which was statistically significant ($\chi^2 = 18.31$, df = 7, $p = .011$) as compared to other sports.

When sports with the highest number of ACL injuries, kabaddi 285 (44.7%) and football 104 (16.3%), were analyzed for knowing the difference between the associated injuries, kabaddi players were found to be highly associated with the injury of the lateral meniscus ($\chi^2 = 6.21$, df = 1, $p = .013$) and chondral damage of the medial femoral condyle ($\chi^2 = 5.75$, df = 1, $p = .016$) as compared to the football players (Table 4).

4. Discussion

ACL injuries are one of the most frequent injuries of the knee joint, which pose serious physical and economic burden on the