Original article

Role of MRI in Sports Injuries related to knee joint: study of 20 patients

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Abstract:

Introduction: Magnetic resonance imaging (MRI) with its multi-planar capabilities and excellent soft-tissue contrast, has established itself as the leading modality for noninvasive evaluation of the sports knee injuries. It is the diagnostic tool for the knee joint evaluation due to its ability to evaluate wide range of anatomy and pathology varying from ligamentous injuries to articular cartilage lesions.

Methods: Twenty patients referred for knee joint pain related to contact sport injury have been evaluated with 3 T MRI.

Results: Abnormal MRI findings were found in all the patients. 16 patients (80%) had ACL injuries, 10 patients (45.5%) had meniscal injuries, 1 patient (5%) had collateral ligament injury, 7 patients (35%) had bone contusions and 11 patients (55%) had mild knee joint and suprapatellar effusion.

Conclusion: In our study, the commonest knee injury in contact sport was ACL injury (80%) followed by meniscal injury (45%).

Key words: Contact sports, MRI (Magnetic resonance imaging), Knee injury, ACL injury, Meniscal injury.

Introduction:

Sports-related knee injuries are common, with contact sports and sports involving twisting movements being the most frequent causes. Sports injuries may affect any of the knee structures, including ligaments, menisci, bones, and cartilage and periarticular soft tissues. However, relatively few injuries involve isolated structures, with complex injuries affecting multiple structures being much more common. Magnetic resonance imaging (MRI) is currently the leading modality for noninvasive evaluation of the sports knee injuries

1. Magnetic resonance imaging is a well-accepted imaging modality in the diagnostic workup of patients with knee complaints and has largely replaced diagnostic arthroscopy for this purpose

Aims:

1. To detect knee injury in sports related injuries.
2. To detect pattern of injury.

Methods:

From November 2015 to July 2016 twenty patients referred for knee joint pain related to contact sport injury have been included in this study. Patients were subjected to a dedicated MRI knee study. MRI was performed on 3T Philips Achieva Scanner. STIR coronal, PD-FS sagittal, PD-FS axial, PD sagittal and T1 coronal sequences were performed.

Inclusion criteria:

- All patients with contact sport injury to knee joint.

Exclusion criteria:
• Non sport related knee injury.

**Results:**
The study included twenty patients complaining of sports related knee pain. Among the 20 patients who had knee injuries, there were 19 males and 1 female ranging in the age group of 20 to 40 yrs. Abnormal MRI findings were found in all the patients (Table 1 and pie diagram 1). Only 3 patients were found to have isolated injury pattern. The rest 17 patients had combined injury pattern. 16 patients (80%) had ACL injuries, 10 patients (45.5%) had meniscal injuries, 1 patient (5%) had collateral ligament injury, 7 patients (35%) had bone contusions (Fig.1A and 1B) and 11 patients (55%) had mild knee joint and suprapatellar effusion (Fig.1A). The contact sports causing knee injuries in this study were found to be football and kabaddi, out of which 18 were football players and 2 were kabaddi players. Among 16 patients (80%) who had ACL injury, 3 patients (19%) had full thickness tear, 10 patients (62%) had partial thickness tear and 3 patients (19%) had sprain (Figs. 2A, 2B and 2C, Pie diagram 2). Among 10 (50%) patients who had meniscal injury (Fig 3, Fig 4, Fig. 5A, Fig 5B), 9 patients (45%) had medial meniscal injury and 1 patient (5%) had lateral meniscal injury. The collateral ligament injury was detected in only one patient who had medial collateral ligament injury (Fig.6).

**Discussion**
The knee is a major weight bearing joint that provides mobility and stability during physical activity as well as balance while standing. MRI of the knee has become a reliable tool in the detection of knee injuries. Injuries to menisci and cruciate ligaments can be diagnosed on MRI with a high degree of sensitivity and specificity, but accuracy of MRI decreases in patients with multiple injuries. Arthroscopy has been considered as the Gold Standard in diagnosis of meniscal and ligament injuries, however MRI remains a reliable, non-invasive modality, which can reduce the use of diagnostic arthroscopy. Zairul-Nizam et al. studied patients with knee injuries and concluded that the MRI is very sensitive in diagnosing meniscus and ligamentous injuries. Nikolaou et al. studied 46 patients and concluded that the diagnostic power of MRI in knee injuries was substantially more than physical examinations.

As compared to study by Waleed Hetta and Gamai Niazi, our study too showed increased prevalence of ACL injuries followed by Meniscal injuries. Combined injuries were much more common as compared to the isolated injury pattern in our study in accordance with their study. However collateral ligament injuries were less prevalent in our study i.e. 1% with respect to their study 8%.

**Conclusion:**
MRI is noninvasive and accurate and can be considered as the primary diagnostic method for evaluation of sports related knee injury. The combined injury with ACL involvement is the most frequent pattern of knee joint injury related to contact-sports.
**Figure 1A:**
Coronal STIR MRI image of knee demonstrating abnormal hyperintensity involving medial femoral condyle and medial tibial condyle suggestive of bone contusions (Arrows). Also noted is minimal knee joint effusion (Asterisk).

**Figure 1B:**
Coronal STIR MRI image of knee demonstrating abnormal hyperintensity involving medial tibial condyle suggestive of bone contusion (Arrow).

**Figure 2A:**
Sagittal PD-FS MRI image of knee demonstrating abnormal hyperintense signal without disruption of fibers i.e. ACL sprain (Asterisk). Also noted is mild knee joint effusion and bone contusion involving the patella.
**Figure 2B:**
Sagittal PD-FS MRI image of knee demonstrating abnormal hyperintense signal with fuzzy margins, disruption of <50% of its fibers i.e. Partial tear of ACL (Asterisk). Also noted is mild knee joint effusion.

**Figure 2C:**
Sagittal PD-FS MRI image of knee demonstrating complete disruption of midfibers of ACL (Asterisk) and abnormal hyperintense signal i.e. Complete tear (Arrow). Also noted is moderate suprapatellar bursal effusion.

**Figure 3:**
Coronal PD-FS MRI image of knee demonstrating abnormal linear hyperintense signal involving body of medial meniscus i.e. horizontal medial meniscus tear. Also noted is minimal joint effusion.
Figure 4:
Sagittal PD-FS MRI image of knee demonstrating complex tear of medial meniscus (Asterisk) with a parameniscal cyst (Arrow).

Figure 5A:
Sagittal PD-FS MRI image of knee demonstrating bucket handle tear of medial meniscus with a part of the fragment displaced more medially (Asterisk); the double PCL sign. Also noted is mild knee joint effusion and mild suprapatellar bursal effusion.

Figure 5B:
Coronal PD-FS MRI image of knee demonstrating bucket handle tear of medial meniscus with a part of the fragment displaced more medially (Arrow). Also noted is mild knee joint effusion.

Figure 6:
Coronal PD-FS MRI image of knee demonstrating bulky medial collateral ligament with abnormal hyperintense signal within (Asterisk) suggestive of Grade I Medial Collateral Ligament injury (Sprain). Mild fluid is also noted lateral to the MCL (Arrow). Also noted is bone contusion involving medial tibial condyle.
### Table 1:

Analysis of overall findings of the patients depicting various patterns of injury.

Only 3 patients had isolated injury with effusion.
Pie chart 1:
Pictorial depiction of overall findings of the patients depicting various patterns of injury with their frequency of involvement.

Pie chart 2:
Pictorial depiction of various grades of ACL injury.
References:


