INTRODUCTION

The knee is the most important weight bearing joints capable of performing complex and extensive movements. It is therefore most frequently affected by the traumatic and degenerative condition. Assessment of internal derangements of the knee begins with clinical evaluation including careful physical examination but imaging is fundamental to accurate diagnosis of many of these derangements. Radiographs of the knee are usually the primary imaging studies in knee injury. But internal ligamentous injuries can’t be evaluated with conventional radiography. MRI provides excellent soft tissue contrast and is capable of evaluating the soft tissue and bony structures of the knee in multiple planes, which provides significant advantage over conventional arthrography, computed tomography and other imaging techniques. The major application of MRI of knee has been evaluation of patient with trauma or suspected internal derangement. MRI has become a valuable diagnostic modality for the evaluation of knee joint injury. MRI not only depicts osseous lesions, but provides information on the cartilage, menisci, ligaments and surrounding soft tissues. MRI can easily diagnose anterior cruciate ligaments (ACL) tear as areas of high signal intensity on T2-weighted sequences. With complete tears, the signal intensity extends throughout the width of the ligament and there is usually separation of the ligament ends at the site of the tear with laxity or loss of the normal course of the ACL (Figure 1). MR imaging can depict chronic tears as areas of intermediate signal intensity, typically with ligament thickening and associated ligament laxity.

Figure 1: Sagittal PD MR image shows complete tear of ACL with edema and increase signal intensity.

On MRI, Posterior cruciate ligament (PCL) partial tears can be diagnosed by eccentric regions of increased signal intensity within the ligament, extending to interrupt a portion of one of the margins of the ligament. Complete tear seen as absence of a portion of the ligament with interposition of hemorrhage and edema with blurred margins is present (Figure 2).
Role of MRI in evaluation of ligamentous injuries of knee

Figure 2: Sagittal PD MR image shows complete tear of ACL with edema and increase signal intensity.

MRI can diagnose different type of Grades of meniscal tears :-

Grade 1 : Globular hyper intensity on T2w image which does not communicate articular surface (Figure 3a).

Grade 2 : Signal intensity is Linear in nature & remains within the substance of the meniscus. With no evidence of communication with the articular surface of the meniscus (Figure 3b).

Grade 3 : There is increased signal intensity within the meniscus that extends to the articular surface (Figure 3c).

Figure 3a: Grade 1  Figure 3b: Grade 2  Figure 3c: Grade 3

Figure 3 a,b,c shows grades of meniscal tear.

On MRI we can easily diagnose complete disruption of Collateral ligament appears as an interruption of its normal contour, whereas a partial tear appears as thickening and high signal intensity within its midsubstance. On MRI, Partial patellar tendon tears are seen as areas of increased signal intensity involving a portion of the tendon. Complete tears are easily diagnosed by the high signal intensity in the region of the tear with separation of the involved tendon and patellar displacement. Several types of osseous injuries have been identified by MRI. Stress fractures, plateau fractures, bone bruises, osteochondral fractures, physeal injuries and other fractures and associated soft tissue injuries have been identified and classified using MRI. Bone bruises are detected easily on STIR images.

MATERIALS AND METHODS

A prospective study of 50 patients with knee injuries were carried out between June 2011 to June 2012. Study group consist of patients from all age groups who came for diagnosis and treatment of knee injury at Orthopedic department in Civil Hospital Ahmedabad. Most patients of knee injuries are referred for MRI of knee to exclude tears in the menisci or ligamentous structures. Most common complaint was pain in the knee joint, difficulty in standing sitting and walking. Most of patients had history of accident like fall from bike, slipped in bathroom or fell from height. Few patients came for post-operative follow up assessment of knee joint. Out of 50 patients, youngest patient was 20 year old and eldest patient was 61 year old. Out of 50 patients, 37 were males and 13 were females. All patients were undergone MRI investigation previously and afterwards. Patients were scanned on Philips 1.5 tesla MRI scanner. Data analysis was done on application software Release 2.6. Technically adequate images were obtained in all patients Result of study was analyzed and compared with other available studies in the literature. PD (Proton Density) with or without fat suppression, T1 WSE (T1-weighted Spin echo), T2 WFSE (T2-weighted Fast spin echo), STIR (Short Tau Inversion Recovery) and Gradient echo pulse sequences are most commonly used in investigating the various structures forming the knee joint. Optimal evaluation of the knee joint includes Sagittal, coronal and axial planes. Short TE (time echo) spin echo sequences such as PD or T1W are preferable for meniscal and ligamentous imaging. The T2W images are useful for ACL (Anterior cruciate ligament) tears. STIR or PD (Proton density) fat suppressed in the coronal or sagittal planes are useful to demonstrate the bone bruises and osteochondral fractures that are associated with ACL tears. T2W gradient echo sequence is equivalent to spin echo imaging for the diagnosis of meniscal pathology. Fat suppression increased the conspicuity of tears and bone marrow pathology. STIR images are useful for evaluating joint effusion, marrow pathology, osteomyelitis, bone bruises and infiltrative neoplasm’s. Intra venous contrast is not routinely indicated in knee joint imaging although it may be required in the delineation of bone tumours. MR arthrography is practiced in many imaging centres for the diagnosis of meniscal tears and chondral defects. As in our centre MR arthrography is not done so we have not included the patient with MR arthrography in our study.

RESULTS

The present study included 50 patients with knee joint injury. In our study, the age group of 31 to 40 years had the largest incidence of knee injury.
In our study, Medial meniscal injury is the most common injury seen in knee injury. Posterior horn of medial meniscus is most commonly injured in knee injury.

Table 2: Site of injuries in meniscus [N=50]

<table>
<thead>
<tr>
<th>Site of injury</th>
<th>Medial meniscus</th>
<th>Lateral meniscus</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Anterior horn</td>
<td>1</td>
<td>2.9</td>
</tr>
<tr>
<td>Posterior horn</td>
<td>31</td>
<td>91.1</td>
</tr>
<tr>
<td>Entire meniscus</td>
<td>2</td>
<td>5.8</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>68</td>
</tr>
</tbody>
</table>

In our study, Posterior horn of medial meniscus was the most common site of injury 65.9% patients having posterior horn injury in medial meniscus which is correlated with Mc cauley et al. and Wolfgang study. In their study, 56% and 60% patients having posterior horn injury in medial meniscus respectively. In our study out of 50 patients, 23 patients (46%) having MCL tear and 12 patients (24%) having LCL tear. According to T H Berquist et al., LCL involved less commonly then MCL. In our study only 1 patient (2%) having patellar dislocation which corresponded with study by Wolfgang having 2-3%. In our study out of 50patients, 1patient (2%) having descoid meniscus in the lateral meniscus. According to Mink et al., lateral discoid meniscus seen in 1.5 to 15.5% and medial discoid meniscus in 0.1 to 0.3%.

DISCUSSION

Meniscal injury is the most common injury seen in knee injury. Medial meniscus is more prone to injury than lateral meniscus. Because lateral meniscus is thicker than medial meniscus and medial meniscus is firmly attached to the capsule so it less mobile and it also bears more force during weight-bearing than the lateral meniscus. ACL is more prone to tear then PCL in knee injury. The PCL is twice as strong as the ACL. It contains a larger cross-sectional area and possesses a higher tensile strength, explaining its lower rate of injury. Associated finding with ligament injury are joint effusion, bone edema and contusion, fracture. In our study out of 50 patients, 64% cases having ACL tear, while in Sonin et al study, 40% cases having ACL tear. In our study, midsubstance tear (37.5%) is the most common site of injury in ACL while in Berquist et al study 90% patients having midsubstance tear. Non visualization of ACL noted in 25% of patients with complete tear of ACL while Barry et al reported 18% patients of non visualization of ACL. In our study, out of 50 patients, 16% patients having PCL injury while in Schulz et al study 20% patients having PCL tear. According to TH Berquist ACL tear are more common then PCL tear. In our study, tear at the site if tibial attachment is the most common site of injury in PCL while in Sonin et al study, tear in the midsubstance is the most common finding. In our study, partial tear was more common then complete tear. Out of 5 patients, 4 patients (80%) having partial tear and 1 patient (20%) having complete tear in the PCL. While in Sonin et al study 47% patients having partial tear. In our study, Posterior horn of medial meniscus was the most common site of injury 65.9% patients having posterior horn injury in medial meniscus which is correlated with Mc cauley et al. and Wolfgang study. In their study, 56% and 60% patients having posterior horn injury in medial meniscus respectively. In our study out of 50 patients, 23 patients (46%) having MCL tear and 12 patients (24%) having LCL tear. According to T H Berquist et al., LCL involved less commonly then MCL. In our study only 1 patient (2%) having patellar dislocation which corresponded with study by Wolfgang having 2-3%. In our study out of 50 patients, 1 patient (2%) having discoid meniscus in the lateral meniscus. According to Mink et al., lateral discoid meniscus seen in 1.5 to 15.5% and medial discoid meniscus in 0.1 to 0.3%.

REFERENCES


