ORIGINAL PROF-594

MEDIAL COLLATERAL LIGAMENT INJURIES;
ASSESSMENT WITH MRI

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ABSTRACT

Injuries of medial collateral ligament of knee were assessed by magnetic resonance imaging in sagittal, coronal and axial planes. 70 patients with history of recent trauma without any known rheumatic disease or any other systemic connective tissue disorder were included in this study in the age range group of 15-50 years. All the patients were in good health history of trauma. The study was conducted at Lahore Medical Imaging (Pvt) Ltd Lahore. Medial Collateral Ligament was found to be injured in 18 patients along with other injuries. The incidence of bone bruises was more in old age group (above 40 years) as compared to younger age group (15-20 years).

INTRODUCTION

It is very difficult to study the injuries of knee especially the ligamentous injury with plain radiography. But MRI has revolutionized the knee study by well documenting the ligamentous injury. The Medial Collateral Ligament (MCL) originates on the medial femoral condyle and inserts on the tibia. It is closely applied to the joint and is intimately associated with the medial joint capsule and the medial meniscus. The MCL is uniformly low signal on all imaging sequences[1].

Injuries to the MCL usually occur from a valgus stress, a blow to the lateral part of the knee. A grade I injury represents a mild strain and is diagnosed on MRI by noting fluid or hemorrhage in the soft tissues medial to the MCL. The ligament is other wise normal. A grade II injury is a partial tear and is seen as a high signal in and around the MCL tear on T2 weighted coronal sequence.

Grade III injury is a complete disruption of the MCL. It can be best appreciated on T2 images. It is essential to use T2 sequences because a T1 weighted image may not detect the fluid between the meniscus and the capsule. They can also be overlooked by arthroscopy if superficial fibers are involved because they are then essentially extra capsular. In literature there has been little emphasis on injuries of MCL[2,3]
as compared with less frequently injured anterior cruciate ligament[4,6] whereas most of thorough description of injury to the MCL are presented in textbook[7]. There has been little systemic study of MCL, therefore the purpose of present study was to evaluate multiple potential signs of MCL injury to determine the relative sensitivities of these signs. We also sought to determine.

1 The accuracy of previously described MRI criteria used to grade MCL tears.
2. The bone bruises associated with MCL injuries.

MATERIALS & METHODS

MRI of traumatic knee in seventy patients for one year from Jan 2000 to Dec 2000 were examined especially for Medial Collateral Ligament injuries. Only eighteen patients were found (14 men and 4 women) having injury to MCL. The age incidence was fifteen to fifty years to have medial collateral ligament injuries as demonstrated on MRI.

After informed consent was obtained and interrogation was made to the presence of pain, effusion, recent trauma or swelling or tenderness, 10 asymptomatic patients (8 men and 2 women) aged 20 to 46 years were included in our study as control objects. Imaging was performed using 0.5 Tesla unit (Picker international) with a small extremity coil.

The following sequences were used;

1. Sagittal T1 weighted
2. Sagittal T2 weighted
3. Coronal T2 weighted
4. Axial T2 weighted.

Coronal T2 weighted and axial FE MAST images were obtained in all patients because the medial collateral ligament is not easily visualized on sagittal images[8].

Only the coronal and axial images in these patients were reviewed irrespective of patients identity, diagnosis and age. The potential signs of medial collateral ligament injury were;

1 Proximal or distal disruption
2 Morphological discontinuity of focal involvement of few fibers.
3 Change of signals in the medial collateral ligament than normal
4 Fluid in medial collateral ligament bursa.
5 Loss of demarcation between adjacent subcutaneous fat and medial collateral ligament signals.

In this study, accompanying bone bruises were also assessed which was considered if poorly defined high signals were seen on fat suppressed T2 weighted images in the bone marrow. Bone bruises were assessed to identify those bruises that were possibly unique to medial collateral ligament injury. Because medial collateral injuries are rarely repaired surgically and are infrequently visualized arthroscopically, clinical evaluation is the standard of reference used to confirm an injury to medial collateral ligament[9,10].

The standard we used in the clinical evaluation of our patients to confirm medial collateral injury was consisted of the presence of knee pain, recent injury and focal medial collateral ligament tenderness with no radiological evidence of fracture. Additionally we applied grading system for MRI that was based on the work of others[11,12].

We considered Grade I tear as when subcutaneous edema was present. Grade II was considered if any morphologic disruption or internal high signal intensity or fluid in medial collateral ligament bursa is seen. Grade III tear was considered if there was discontinuity.

RESULTS

According to the criteria laid down, the signs for MCL tears were highly specific. The signs were reproducible in all cases. Bone bruises were quite common and were usually seen in femur.

The percentage of bone bruises involvement in MCL tear was 20%. Typically these bruises were located on medial aspect of the femur rather than lateral aspect.

Two of our patients had both medial and lateral bruises that were probably related with the mode of trauma. Tibial bruises were not much documented but those which were present were on medial aspect as two of our patients in this study.

Instability was most common with Grade I and least with Grade III injuries to MCL. Therefore the MRI criteria for grade I-III tears may not be accurate.

Most of the signs correlated with each other, except for those though to represent severe grade of injury.

KNEE PROTOCOL						
PLANE	TR/TE	NEX	MATRIX	FLIP ANGLE	THICKNESS	FOV
Sagittal	674/20	3	195x256	90°	3.5mm	18
Sagittal	1929/80	2	195x256	90°	3.5mm	18
Coronal	2030/709	1	192x256	90°	3.5mm	18
Axial	1022/33.5	2	192x256	50°	3.5mm	18

DISCUSSION

MRI is a painless procedure even in acutely injured patients and it can depict internal derangements of the knee with accuracy comparable with arthroscopy. Evaluation by examination and MRI will to help define all ligamentous and associated injuries[13].

MCL is the most weakest ligament in the knee among the primary stabilizers like anterior cruciate ligament and lateral collateral ligament complex[14]. It is therefore the most frequently injured knee ligament. It is composed of layers or functional units. It has low signal intensity on all the RF Pulse sequences. There is also association of MCL tears with meniscocapsular separation . MCL has been thought to protect against excessive valgus stress and external rotation however biomechenical studies have demonstrated a more limited role in which its function appear to be crucial only in the flexed knee[15]. Therefore injury to the MCL occurs with a valgus stress to the flexed knee. Although the deep fibers tear first, they have little stabilizing effect. Therefore most MCL tears do not cause instability[14].

The grading system used for classifying MCL tears is identical to that user for other ligaments[13].

1. GRADE I Microscopic injury.
2. Grade II Partial tears.
3. Grade III Complete tears[13]

Although all tears of MCL are associated with other injuries to the knee particularly MCL tears, the highest associated injuries occur with Grade III tears.

In this study Grade I tears depicted subcutaneous edema. Grade II MCL tears demonstrated internal high signal intensity or morphologic disruption. Complete MCL tears should logically demonstrate discontinuity[7].

One limitation of this study was that no direct comparison was made between grades determined at clinical evaluation and those determined at MR Imaging. This is because Grades for MCL injuries were not often documented on patients records medically provided. Although it is fact that MCL injuries are diagnosed clinically first. In orthopedic literature it is consensus that Grade I and Grade II injuries should be more prevalent than grade III tears. This study correlate well with the clinical assessment. In this study association of bone bruises along with MCL injury was also documented and we observed that most of the bruises were on the opposite side of the injury, this favored our study. As MCL & ACL tears often occur together it was impossible to differentiate whether the bruises were due to MCL injury or ACL tears. Lateral bruises were also been explained by the fact that direct impact of a valgus stress with the secondary tensile force disrupts the MCL. The patient No. 10 of our study was having accompanying injury of ACL along with injury of MCL. Bone bruises of lateral side are also mentioned in previous study and the medial bruise may be a manifestation of micro-avulsions.

A very sensitive sign of MCL tear include facial edema and loss of demarcation of adjacent fat. We documents this sign in our study also and it favors the previous studies. Interestingly loss of demarcation from adjacent fat and bone bruises were also found in symptomatic volunteers. Each of these signs were seen only in four control subjects. In some MCL bursal fluid was noted but it was considered normal variant. In the last but not the least the most sensitive sign of MCL injury were loss of sharp demarcation from adjacent fat and facial edema.

Bone bruises are common in M C L tears and appear to be located on lateral aspect at the site of injury. The sensitivity of MRI for M C L tears is variable in different studies including this study so the system may not be considered accurate for staging of M C L tears. by Magnetic Resonance Imaging.

REFERENCES

1. Clyde A. Helms MD. Fundamentals of Skeletal Radiology 2nd ed. WB Saunders 186; 1995.

2. Tumer DA, Prodromas CC, Petasnick IP, Clark JW. Acute injury of the ligaments of the knee, Magnetic Resonance evaluation. Radiology 154: 717-722; 1985.

3. Garvin GJ, Mink PL, Vellet AD, Tears of the Medial Collateral Ligament. Megnatic Resonance Imaging finding and associated injuries. Radiol 44: 199-204; 1993.

4. Remer EM, Gerald SW, Friedman H, Rogers LF, Hendrix RW, Schafer MF. Anterior cruciate ligament injuries. MRI diagnosis and pattern of injury. Radiographics 12: 901-15; 1992.

5. Vayey TN, Hunt IF, Shelbourne KD. Anterior translation of tibia at MRI secondary signs of anterior cruciate ligament tear. Radiology 187: 817-19; 1993.

6. Robertspm P, Schweitzer MF, Bartolozzi A, Ugoni A. Anterior ligament tears. Evaluation of multiple signs with MRI Radiology 193:829-34; 1994.

7. Stoller DW, Cannon WD, Andersn JJ. The knee in stoller dwed magnetic. Resonance imaging orthopedics and sports medicine philadelphia. Pa,Lipponcott 139-372; 1993.

8. Munk PL. Helms CA, Genant HK, Holt RG. Magnetic Resonance Imaging of the knee, current status new directins. Skeltal Radil 18: 569-577; 1989.

9. Fetto IF, Marshall JI, Medial collateral ligament injuries of the knee, a rationale for the treatment. Clin Orthop 132: 206-218; 1978.

10. Dersaherd GL, Garrick JG. Medial collateral ligament injuries in football: non operative management of grade I & grade II sprains . Am J Sports Med 9: 365-68; 1981.

11. Martire IR, Levinshon FM. Imaging of athletic injuries a multimodality approach. New York NY McGraw Hill 17; 1992.

12. Berquist TH. Imaging of sports injuries Gaithersburg MD Aspen 146; 1992.

13. Cole BJ, Hamer CD. The multiple ligament injuries knee. Clin Sports Med Jan; 18(1): 241-62; 1999.

14. Cham KM, Hsu CYC. Cartilage and ligament injuries in sports injuries . In renstrum PA, Ed London, England, Oxford University Press 54-70; 1993.

15. Mink JH, The cruciate and collateral ligaments in MRI of the knee 2nd ed. Mink JH et al, eds New York NY. Raven 141-188; 1993.

Often the test of courage is not to die but to live

Alfieri