



International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2017; 3(1): 275-277
© 2017 IJOS
www.orthopaper.com
Received: 13-11-2016
Accepted: 14-12-2016

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MRI of posterolateral corner complex injuries of knee and why it should be included in reporting formats

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DOI: <http://dx.doi.org/10.22271/ortho.2017.v3.i1.e.43>

Abstract

This is a retrospective study done in St John's Hospital, Bangalore, India where MRI of all knee trauma cases between age groups 17 to 38 was evaluated retrospectively from November 2015 to February 2016. We got a total of 39 positive cases out of which 18 cases had features of posterolateral corner injuries. Paediatric and older patients with advanced osteoarthritis were not included in the study. Out of 18 patients, the most common structure to get injured was fibulopopliteal ligament - 11(61.1%) and popliteus tendon / muscle - 11(61.1%) followed by posterolateral capsule and arcuate ligament complex - 10(55.55%) and Lateral collateral ligament - 7(38.8%). The most common associations were Anterior cruciate ligament tear 11 out of 18 (61.1%), followed by Meniscus 10 out of 18 (55.5%), Medial collateral ligament 2 out of 18 (11.11%), fracture of tibial plateau 2 out of 18 (11.11%) and tear of Posterior cruciate ligament, biceps tendon and patellar retinaculum 1 out of 18 each (5.55%).

Keywords: PLC, knee, hyperextension, varus

1. Introduction

The structures within the posterolateral corner of the knee have recently been "re-discovered" providing a very important role in maintaining the stability of the knee. [1]. As the name suggests the PLC is a collection of tissues located at the back, outer corner of the knee rather than one individual structure. Together these tissues resist knee hyperextension, varus angulation and tibial external rotation. PLC injuries most often occur with simultaneous cruciate ligament ruptures. Approximately 7-16% knee ligament injuries are to the lateral ligamentous complex.

In patients with central ligamentous injuries, the presence of a posterolateral corner injury influences treatment and surgical planning. Untreated injuries to the posterolateral corner may lead to posterolateral knee instability and have been identified as a cause of anterior cruciate ligament graft failure [6] and to improve the chances of success of the PCL reconstruction [9].

2. Materials and Methods

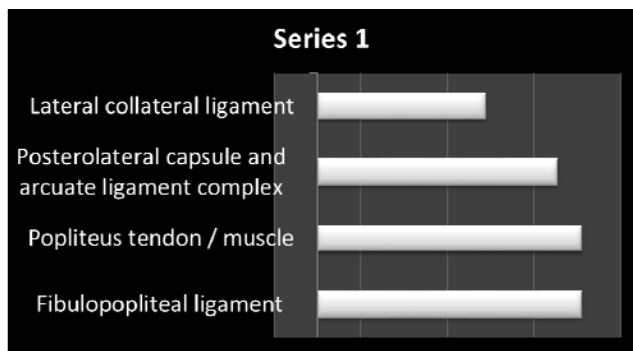
MRI of knee joint was done on 1.5 Tesla GE HDx machine on all patients. The routine 3 mm sequences were acquired in Axial PD FSE (fat sat), Coronal PD FSE (fat sat), Sagittal Obl PD FSE (fat sat), Coronal T1 SE and Sagittal Obl T2 FSE (fat sat)

The study was conducted in St John's Medical College, Bangalore from June 2012 to November 2015 on a total of 18 adult patients of age group 17 to 38 years with complaints of knee pain / instability.

3. Results

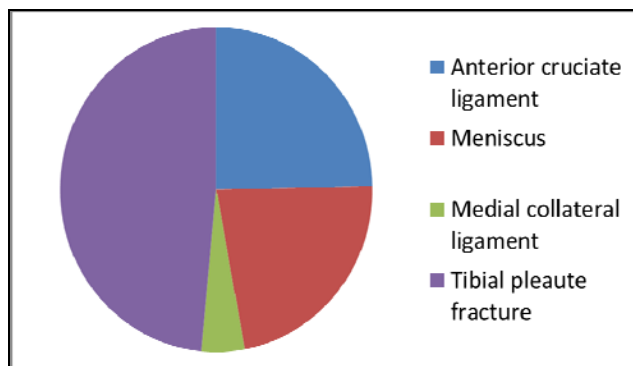
Out of 18 patients, 2 were female and 16 were male. 10 were sports related injury, while 6 had history of road traffic accident and 2 had history of fall.

Out of 18 patients, the most common structure to get injured was fibulopopliteal ligament - 11(61.1%) and popliteus tendon / muscle - 11 (61.1%) followed by posterolateral capsule and arcuate ligament complex - 10 (55.55%) and Lateral collateral ligament - 7(38.8%) (Table1).



Out of 18 patients only 3 (16.66%) had isolated posterior lateral complex injury while the remaining 83.34% had associations cruciate, meniscus and patellar tendon / retinaculum tear and tibial plateau fracture.

The most common associations were Anterior cruciate ligament tear 11 out of 18 (61.1%), followed by Meniscus 10 out of 18 (55.5%), Medial collateral ligament 2 out of 18 (11.11%), fracture of tibial plateau 2 out of 18 (11.11%) and tear of Posterior cruciate ligament, biceps tendon and patellar retinaculum 1 out 18 each (5.55%). Table 2



Better understanding of PLC anatomy and biomechanics has led to improved diagnostics and development of surgical techniques that successfully restore knee stability.

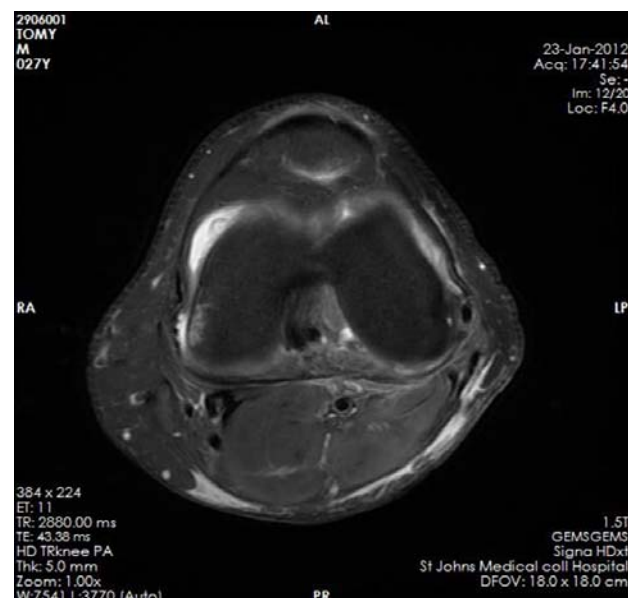


Fig 1: Axial STIR images shows linear hyper intense signal around the Biceps femoris tendon

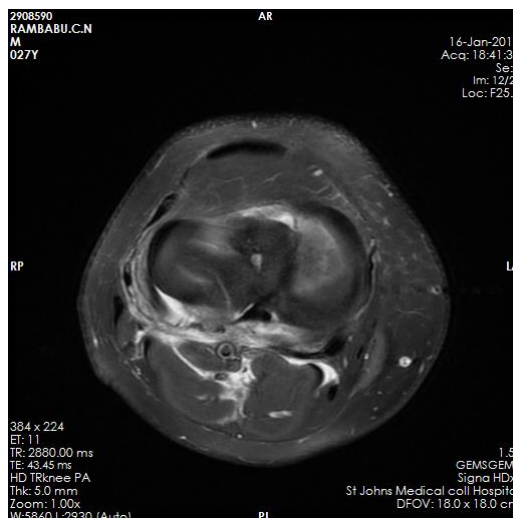


Fig 2: Axial STIR images of knee joint shows hyper intense signal in the region of arcuate ligament and joint capsule complex



Fig 3: Sagittal STIR images shows hyper intense signal in the popliteal tendon



Fig 4: Coronal STIR images shows hyper intense signal extending along the Lateral collateral ligament

4. Discussion

The anatomy of the posterolateral corner is complex. it consists of three layers, the superficial, middle and deep layer. The deep layer is the most important and consists of the following structures the popliteus muscle and its tendon, the

popliteofibular ligament, the joint capsule, the arcuate ligament, the lateral collateral ligament (LCL), the fabella, the fabello-fibular complex and the peroneal nerve (!)

PLC function as secondary stabilizers, with the PLC acting mostly in the early degrees of flexion. FCL helps to control external rotation in the beginning of knee flexion (0–30°), while the popliteus complex controls external rotation at higher degrees of knee flexion [2].

The mechanism of injury of posterolateral corner injury is either a direct blow to the anteromedial proximal tibia, directed posterolaterally, with the knee near full extension, this is thought to be the most common cause. [3]. The various manifestations of posterolateral corner injury include swelling and pain along the outside of the knee, Side-to-side instability and Difficulty twisting, turning and pivoting

Clinically, a numeric scale is often qualitatively used to describe the degree of ligamentous instability as 1+ (mild), 2+ (moderate), or 3+ (severe) [1, 4].

Unrecognized and untreated posterolateral corner instability is possibly the most common identifiable cause of ACL and PCL reconstruction failure, other complications include Arthrofibrosis and Peroneal nerve injury [5].

The various treatment options include Non-operative and operative. Non operative treatment is indicated in Grade I and II. This requires To Immobilize the affected knee in full extension with protected weight bearing for 2 weeks, with progressive functional rehabilitation. Operative methods are indicated in isolated Grade III injuries and complex combined ligament injuries. it includes ACL reconstruction and/or PCL reconstruction / repair followed by rehabilitation [6, 7].

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