Original article:

Study of efficacy of radiological findings of multiple ligament injuries

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Abstract:
Introduction: In the present study selected patients will be evaluated radiologically on x-ray & magnetic resonance imaging as it can help us in diagnose the various patterns and grading of multiple ligament injury which will help in the treatment of lesion in a better way.

Methodology: MRI of the knee was done for each patient in the study by 1.5T machine after 7 to 10 days of trauma, when the internal edema subsided. We evaluated total 30 of cases of multiple ligament knee injuries clinically and radiologically during the period of april 2012 to September 2014.

Results: Although clinical examination is important for the diagnosis of ligament injury, painful stress examinations are not always accurate in the acute phase of injury. For that reason MR imaging is indicated for early diagnosis of the acutely injured knee.6

Conclusion: Thus we concludes that MRI is better non-invasive diagnostic tool for multiple ligament knee injuries than clinical examination which provides with the information of ligaments involved, grade of involvement and is cost effective.

Keywords: MRI, Knee injury

Introduction
The knee is one of the most frequently injured joints because of its anatomical structure, its exposure to external forces and the functional demands placed on it. The knee joint is the largest and probably the most complex joint within the human body its vital importance in support and locomotion of our bipedal existence. Its position between the two longest lever arms of the skeleton makes it vulnerable to injury, damage to its major components results in much discomfort and disability.1,2,3

Diagnosis and treatment of multiple ligament injuries of the knee remain real challenges for most surgeons. These injuries involve the rupture of at least two of the main ligaments of the knee, and are associated with meniscus ruptures, cartilage injuries and osseous fractures. Because of the potential for disastrous complications, the evaluation and treatment of the knee that has acute, multiple ligament injuries should be considered a knee dislocation, until proven otherwise.4 Magnetic resonance imaging (MRI) is almost an essential tool to assist in the diagnosis of the Multiple Ligament Knee Injuries and assists in the formulation of the treatment plan.4 An accurate examination may be difficult even for an experienced examiner in this situation and it may be that an arthritic knee may not allow a complete examination. A conclusive diagnosis was therefore not possible. In these situations, the value of MRI is heightened and invariably is requested for confirming the
diagnosis.\textsuperscript{5} MRI considered as a clarifying diagnostic tool when a clinical examination indicates a lesion of the meniscus. The combination of clinical and MRI findings would reduce the number of blank arthroscopies to 5\%. MRI is a valuable diagnostic tool in planning the type of anesthesia and treatment, and could significantly reduce the need for a second arthroscopy.\textsuperscript{6} Clinical tests used in the diagnosis of meniscal and cruciate ligament damage have limitations and it may not be possible to elicit objective signs repeatedly, more so in a busy orthopedic clinic and being painful in an acute or sub acute presentation. An accurate clinical diagnosis requires experience although difficult to quantify. Magnetic resonance imaging [MRI] has revolutionized the diagnosis and management of intra-articular pathology and ligamentous injuries. Being non invasive and a highly sensitive tool of investigation, early and subtle changes in the soft tissues often are picked up by MRI. Arthroscopy being highly sensitive and specific procedure is both diagnostic and therapeutic, but is invasive.\textsuperscript{7} In the present study selected patients will be evaluated radiologically on x-ray \& magnetic resonance imaging as it can help us in diagnose the various patterns and grading of multiple ligament injury which will help in the treatment of lesion in a better way.

\textbf{Materials and methods}

\textbf{Type of Study:} Prospective study

\textbf{Place of study:} Dr. D. Y. Patil Medical College, Hospital \& Research Centre Pimpri, Pune-18.

\textbf{Period of study:} April 2012 to September 2014

\textbf{Sample size:} 30 cases

\textbf{Period of data collection:} 2 years

Period required for data analysis and reporting: 6 months

The study was approved by the local ethical committee and the patients gave their informed consent to participate.

\textbf{Inclusion criteria:}

\begin{itemize}
  \item Patients of both sexes and age groups 17 years to 60 years will be included.
  \item Patients with clinical signs and symptoms after injury.
  \item No previous surgery performed on the affected knee.
  \item No previous cruciate or collateral ligament damage sustained in the affected knee.
\end{itemize}

\textbf{Exclusion criteria:}

\begin{itemize}
  \item Single ligament injury.
  \item Patients with generalized ligament laxity.
  \item Patients with fractures and compound injuries.
  \item Patients who are uncooperative and unwilling for clinical examination.
\end{itemize}

\textbf{Magnetic resonance imaging (mri)}

MRI of the knee was done for each patient in the study by 1.5T machine after 7 to 10 days of trauma, when the internal edema subsided.

\textbf{Observations and results}

We evaluated total 30 of cases of multiple ligament knee injuries clinically and radiologically during the period of April 2012 to September 2014.
Table 1:  Association between clinical and radiological findings of multiple ligament injury in study group

<table>
<thead>
<tr>
<th>Clinical finding</th>
<th>Radiological finding</th>
<th>Chi-square</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
<td></td>
</tr>
<tr>
<td>ACL  Lachman</td>
<td>Present</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>ACL  Ant. Drawer</td>
<td>Present</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>PCL  Sag test</td>
<td>Present</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>PCL Post. Drawer</td>
<td>Present</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>2</td>
<td>23</td>
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<tr>
<td>MCL  Valgus Test</td>
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</tr>
<tr>
<td></td>
<td>Absent</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>LCL  Varus test</td>
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<tr>
<td></td>
<td>Absent</td>
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<tr>
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<td>18</td>
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<tr>
<td>McMurrays (IR)</td>
<td>Present</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Absent</td>
<td>4</td>
<td>22</td>
</tr>
</tbody>
</table>

Discussion

Since introduction of MRI for clinical use in the mid 1980’s, the role of MRI in the diagnosis of knee lesions has been well established. MRI has proved reliable, safe and offers advantages over diagnostic arthroscopy, which is currently regarded as the reference standard for the diagnosis of internal derangements of knee. MRI has several advantages. It is noninvasive, poses minimal risk, produces minimal patient discomfort and posterior cruciate ligament is also easily seen on MRI. Aside from routine Radiography, no imaging method has as great an effect on the current practice of orthopedics as MRI. It provides unsurpassed soft-tissue contrast and multiplanar capability with spatial resolution that approaches that of CT. Consequently, MRI has superseded older imaging methods, such as Myelography, Arthrography, and Angiography. MRI has become a powerful diagnostic tool, helping the surgeon to evaluate structures that are otherwise invisible to noninvasive techniques. MRI is unrelated to any of the older imaging techniques. MRI images are created by placing the patient in a strong magnetic field (approximately 30,000× stronger than the earth’s magnetic field). The magnetic force affects the nuclei within the field, specifically the nuclei of elements with odd numbers of protons or neutrons. The most abundant element satisfying this criterion is hydrogen, which is plentiful in water and fat. These nuclei, which are essentially protons, possess a quantum spin. When the patient’s tissues are subjected to this strong magnetic field, protons align
themselves with respect to the field. Because all imaging is performed within this constant magnetic force, this becomes the steady state, or equilibrium. In this steady state, a radiofrequency pulse is applied, which excites the magnetized protons in the field and perturbs the steady state. After application of this pulse, a receiver coil or antenna listens for an emitted radiofrequency signal that is generated as these excited protons relax or return to equilibrium. This signal, with the help of localizing gradient fields and Fourier transformation, creates the MRI image. In the acute phase of knee injury, the indication of MR imaging depends upon severity of pain and/or swelling of knee joint. Although clinical examination is important for the diagnosis of ligament injury, painful stress examinations are not always accurate in the acute phase of injury. For that reason MR imaging is indicated for early diagnosis of the acutely injured knee. Conclusion:

Thus we concludes that MRI is better non-invasive diagnostic tool for multiple ligament knee injuries than clinical examination which provides with the information of ligaments involved, grade of involvement and is cost effective.

References: