Reliability Assessment of Arthroscopic Findings Versus MRI in ACL Injuries of the Knee

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ABSTRACT
Introduction: This study was conducted to analyze the reliability of clinical diagnosis in ACL tear injuries. Material and methods: All patients attending our clinic with knee pain from 2009 to 2013 underwent systematic and thorough clinical assessment. From one hundred and three patients with knee problems in 73 were arthroscopically diagnosed ACL tears. All these patients underwent therapeutic arthroscopic knee surgery. The clinical diagnosis was confirmed during this procedure. The accuracy, sensitivity and specificity were calculated based on these arthroscopic findings. Results: The accuracy of clinical diagnosis in our study was 82.5% for ACL tears. Our study revealed high sensitivity and specificity and almost high accuracy for ACL injuries of knee joint in comparison to arthroscopy. MRI is an appropriate screening tool for therapeutic arthroscopy, making diagnostic arthroscopy unnecessary in most patients. Conclusion: Magnetic resonance imaging is accurate and non invasive modality for the assessment of ligamentous injuries. It can be used as a first line investigation in patients with soft tissue trauma to knee.
Key words: MRI, arthroscopy, ACL, knee.

1. INTRODUCTION
The knee joint is a common site of injury, mainly due to trauma, repetitive activities and sports activities (1).
Disruption of the anterior crucial ligament (ACL), a major stabilizer of the knee, leads to loss of stability of the knee and potentially significant dysfunction, although the ACL is the most frequently torn ligament of the knee; the ACL tear has remained clinically elusive. Additionally, ruptures near ligaments’ insertion may be missed and magnetic resonance imaging (MRI) examination reveals an intact ACL. The accuracy, sensitivity and specificity values for knee lesions vary widely in literature (2).
The clinical relevance of MRI, however, is determined in one way by its value in the selection of patients for or exclusion of patients from treatment with therapeutic arthroscopy. This overall assessment of the entire joint, also called composite diagnosis (3), is more relevant than the accurate diagnosis of all specific lesions of the various anatomic structures.
Determination of the clinical relevance of MRI can be affected by selection bias. Selection criteria for arthroscopy, results of which are used as the reference standard, play a role in most studies and potentially have a major influence on the interpretation of MRI results. MRI has a better soft tissue contrast and multi planar slice capability which has revolutionized and has become the ideal modality for imaging complex anatomy of the knee joint (4).
Advanced modality in the management of internal derangement of knee joint is arthroscopy, which can be used in its dual mode, either as diagnostic and/or as therapeutic tool. Arthroscopy offers direct visualization of all interarticular structures with high diagnostic accuracy, the possibility to examine the stability of the knee under anesthesia and the possibility to perform a therapeutic procedure in the same session (5).
In this study ACL tears were clinically diagnosed by positive Anterior Drawer Test and positive Lachman test. Arthroscopy was used to assess the reliability of clinical diagnosis.

2. PATIENTS AND METHODS
In our study we involved 103 patients with history of knee injuries who were admitted in the Clinic of Traumatology, Clinical Center-Majka Tereza, Skopje. MRI of the knee joint was done before the admission and some of them before the clinical examination.
Patients were subjected to physical examination involved assessing Anterior Drawer Test and positive Lachman test. The major difference between these is the degree of knee flexion (90 degrees in the drawer sign and 20-30 degrees in Lachman). All clinically diagnosed patients underwent diagnostic and
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3. RESULTS

The study group of 103 patients consisted of 81 men (79%) and 22 women (21%). All underwent arthroscopic knee surgery. The average age was 29.7 years (range: 16–58 years). Maximum number of patients (n=34) who suffered knee injuries were in the age group of 21-30 years (Figure 1). The right knee was involved in 56 cases (54.4%) and the left knee in 47 (45.6%) (Figure 2).

Comparison of the arthroscopic and MRI findings yielded the following results. MRI findings for the ACL yielded 60 true-positives (were confirmed on arthroscopy) and 25 true-negatives (without evidence of ACL) with 5 false positive (were miss interpreted to have ACL)
and 13 false negative (were not diagnosed clinically) (Table 2; Figure 3), which resulted in 83% sensitivity, 88.37% specificity, 93% positive predictive value, 74.5% negative predictive value and 82.5% accuracy (Table 3).

McNemar test showed that $x^2=3.55$, DF=1, $p>0.05$, i.e. There are no statistical differences in distribution of frequencies in positive and negative patients with MRI and arthroscopy or perceived difference is not statistically significant (Figure 4).

The age group ranging from 16 to 58 years. The youngest male patient was aged 16 years and the oldest female was 58 years. This showed that there was a tendency of males being injured and getting operated at the earlier age. A study done by Avcu et al. (6) showed males are most likely to suffer knee injuries since they are active in sports and the right knee was more frequently injured than left.

Rubin et al. (7) reported 93% sensitivity for diagnosing isolated ACL tears. Similarly several prospective studies have shown a sensitivity of 92-100% and specificity of 93-100% for the MR imaging diagnosis of ACL tears (8).

We obtained 83% sensitivity and 88.37% specificity of MRI with respect to fair correlation with arthroscopy in diagnosing ACL tears. Identification of ACL tears in our study was presented with 82.5% accuracy, 93% positive predictive value, 74.5% negative predictive value and 82.5% accuracy (Table 3).

### Table 2. MRI and Arthroscopy findings

<table>
<thead>
<tr>
<th>Test</th>
<th>ACL (%)</th>
</tr>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>83</td>
</tr>
<tr>
<td>Specificity</td>
<td>88.37</td>
</tr>
<tr>
<td>Positive predictive</td>
<td>93</td>
</tr>
<tr>
<td>Negative predictive</td>
<td>74.5</td>
</tr>
<tr>
<td>Accuracy</td>
<td>82.5</td>
</tr>
</tbody>
</table>

### Table 3. ACL findings

<table>
<thead>
<tr>
<th>Test</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI+Artr.</td>
<td>60 (TP)</td>
</tr>
<tr>
<td>MRI-Artr.</td>
<td>13 (FN)</td>
</tr>
<tr>
<td>MRI+Artr+</td>
<td>5 (FP)</td>
</tr>
<tr>
<td>MRI-Artr+</td>
<td>25 (TN)</td>
</tr>
</tbody>
</table>

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**4. DISCUSSION**

The purpose of this study was to assess the reliability of clinical diagnosis in ACL tear injuries. In
natives are discussed thoroughly with the patient before the procedure, and the definitive surgical procedure is performed at the time of an arthroscopic examination.

5. CONCLUSION

Our study revealed high sensitivity and specificity and almost high accuracy for ACL injuries of knee joint in comparison to arthroscopy. Findings of this small scale study of our population are consistent with larger studies in this field. So we have sufficient evidence to conclude that MRI is highly accurate in the diagnosis of ACL. MRI is an appropriate screening tool for therapeutic arthroscopy, making diagnostic arthroscopy unnecessary in most patients.

Magnetic resonance imaging is accurate and non-invasive modality for the assessment of ligamentous injuries. It can be used as a first line investigation in patients with soft tissue trauma to knee.

CONFLICT OF INTEREST: NONE DECLARED

REFERENCES