ARTHROSCOPIC DETERMINATION OF ACCURACY OF CLINICAL EXAMINATION IN INJURIES WITH INTERNAL DERANGEMENT OF KNEE

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Abstract

Background: For the diagnosis of knee injuries some investigations along with detailed history and clinical examination such as arthrography and arthroscopy are required, which increase the authenticity of diagnosis.

Objective: To determine diagnostic accuracy of pre-operative clinical diagnosis with arthroscopic diagnosis in internal derangement of knee.

Methods: This was a Comparative cross sectional study. Conducted at Department of Orthopaedic Surgery and Traumatology (DOST) Unit – I, King Edward Medical University, Mayo Hospital Lahore. Total 45 patients having symptomatic knee injuries, were included in this study. After taking informed consent from these patients, a clinical diagnosis of medial meniscus tear (MMT), lateral meniscus tear (LMT), anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), medial collateral ligament (MCL) and lateral collateral ligament (LCL) injury of knee was made, confirmation with magnetic resonance imaging (MRI) was done and those patients having positive clinical and MRI findings of above mentioned injuries arthroscopy was carried out and then findings of both clinical examination and arthroscopy were compared to find out the diagnostic accuracy of clinical examination. Data was analyzed with the help of SPSS version 20.

Results: Mean age of all 45 patients was 29.51 ± 8.72 years. Minimum and maximum age of patients was 18 and 48 years respectively. Clinical examination is 70.83% sensitive and 19.05% specific for medial meniscus tear. Clinical examination has 50% Positive predictive value and 36.36% Negative predictive value. For the diagnosis of Lateral Meniscal tear, clinical examination is 16.67% sensitive and 89.47% specific. While clinical examination has 20% positive predictive value and 87.5% negative predictive value. For ACL rupture diagnosis clinical examination is 72.73% sensitive and 66.67% specific. While clinical examination has 85.71% positive predictive value and 47.06% negative predictive value.

Conclusion: Results of this study clearly revealed...
that diagnostic accuracy of clinical examination for the
diagnosis of internal derangement of knee shows vari-
ability. Clinical examination findings have high sen-
sitivity for diagnosis of MMT and ACL injuries while it
shows very low sensitivity for LMT. While specificity
of clinical examination for diagnosing LMT and ACL
was high but for MMT was low.
Key Words: Arthroscopy, Clinical Examination,
Internal derangement, Knee.

Introduction
Knee is the most commonly injured joint due to its
complex anatomy, forces acting on it and the demand
of body functions.\(^1\)

Menisci among young people are frequently inju-
red in the knee trauma from road traffic accidents and
sports in the field.\(^2\) Anterior cruciate ligament ruptures
frequently occur with meniscal injuries. Occurrence of
injuries to meniscus differ significantly, ranging from
16% to 82% with acute anterior cruciate ligament rup-
tures, while about 96% of injuries to meniscus occur
with the chronic anterior cruciate ligament ruptures.\(^3\)
Contact injuries are responsible for 30% of anterior
 cruciate ligament injuries and 70% is caused by the
non-contact injuries.\(^4\) Globally, acute traumatic knee
injuries have remained a diagnostic and therapeutic
challenge. Physical examination of knee joint is the
primary and cost effective tool for diagnosis. Wide
availability of Magnetic resonance imaging (MRI) has
resulted in less reliance on clinical examination of the
knee and as a result this important skill is in danger of
being lost. Despite availability of several clinical tests
an experienced clinician can miss the diagnosis. Mag-
netic resonance imaging is far from incapable of error
for diagnosing knee injuries, so, there is reason to pre-
fer arthroscopy in those patients who are strongly sus-
picious of having knee injuries. Arthroscopy is the
frequently performed method for diagnostic and ther-
apeutic purposes in knee injuries, having 95% accuracy
as reported in some previous studies.\(^5\) If the arthros-
copy is performed by an experienced knee arthro-
sopic surgeon it is the gold standard method of diagno-
sis. Because of the diagnostic accuracy of arthroscopy,
it can be used as the benchmark for the assessment of
usefulness and the sensitivity of the other diagnostic
tools.\(^5\)

To have an economical and time conserving dia-
agnosis, we decided to conduct this study to check if
clinical examination has high accuracy for diagnosing
knee injuries and we can proceed directly to arthrosco-
pic surgery without doing MRI.

Patient and Methodology
In this study Forty five (45) patients with suspected
internal pathologies of the knee joint as determined by
detailed history and clinical examination, not respond-
ing to non-surgical treatment were selected from out-
patient department (OPD). After taking informed con-
sent from these patients, a clinical diagnosis of meni-
scal, anterior cruciate ligament, posterior cruciate liga-
ment, medial collateral ligament and lateral collateral
ligament injury of knee was made, confirmation with
MRI was done and those patients having positive cli-
nical and MRI findings of above mentioned injuries
arthroscopy was carried out and then findings of both
clinical examination and arthroscopy were compared
to find out the diagnostic accuracy of clinical examina-
tion. Findings of both clinical examination and arthro-
scopy were documented on prescribed form, proforma
and transferred to Microsoft excel file. Clinical exami-
nation of patient was performed by researcher and
arthroscopy was performed by specialized knee arthros-
copic surgeon. Procedure was performed after giving
spinal or general anesthesia with preoperative antibi-
obiotic and tourniquet-controlled blood less field.

Results
Mean age of all 45 patients was 29.51 ± 8.72 years.
Minimum and maximum age of patients was 18 and 48
years respectively. Mean age of male and female pati-
ents was 29.21 ± 8.85 and 33.66 ± 6.35 years respec-
tively. Gender distribution of patients shows that there
were 42 male and only 3 female patients in this study.
In Graph of patients showing mode of injury. On ask-
ing patients told that 7 patients had fall, 21 patients
suffered from Road Traffic Accident and 17 patients
suffered from sports injury. There were 18 patients
whose left knee was affected and in remaining 27 pati-
ents right knee was affected. Principle complaints ex-
perienced by patients were all patients had given a
positive history regarding pain, 5 (11.1%) patients had
swelling, 19 (42.2%) patients had clicking, 21 (46.7%)
patients told that they had feeling of giving away while
6 (13.3%) patients had locking (Table 1). According
to physical assessment, effusion was present in 10 pa-
tients and Quadriceps wasting was present in all pati-
Table 1: Principle Complaints of Patients.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Yes</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Swelling</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>40</td>
</tr>
<tr>
<td>Fever</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Clicking</td>
<td>Yes</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>26</td>
</tr>
<tr>
<td>Giving Away</td>
<td>Yes</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>24</td>
</tr>
<tr>
<td>Locking</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>39</td>
</tr>
</tbody>
</table>

tents. Contractures, scar mark and visible pulsation were absent in all patients. Thirty two (71.1%) patients had medial, 1 (2.2%) had lateral, 3 (6.7%) both medial and lateral site of joint tenderness while 9 (20%) had no joint line tenderness. Posterior drawer test, Posterior Sag test, Varus stress and Valgus stress test were negative among all 45 patients. While McMurry test was positive in 22 (48.9%) patients. Aplay grinding test was positive in 15 (33.3%) patients. Squat test was positive in 26 (57.8%). Lachmann test was positive in 21 (46.7%) and Anterior drawer test was positive in 26 (57.8%) patients (Table-2). Clinical examination for diagnosis of medial meniscus tear was 70.83% sensitive and 19.05% specific. Positive predictive value and Negative predictive value of clinical examination was 50% and 36.36% respectively. Clinical examination for the diagnosis of Lateral Meniscal tear was 16.67% sensitive and 89.74% specific. While positive and negative predictive value of the clinical examination was 20% and 87.5% respectively. Clinical examination was more specific and had high negative predictive value while it had low sensitivity and positive predictive value for diagnosis of lateral meniscal tear. Clinical examination for the diagnosis of ACL was 72.73% sensitive and 66.67% specific. While the positive and the negative predictive value of the clinical examination was 85.71% and 47.06%.

Table 2: Special Clinical Tests for Knee Injuries.

<table>
<thead>
<tr>
<th>Test</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>McMurray Test</td>
<td>Yes</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>23</td>
</tr>
<tr>
<td>Aplay grinding Test</td>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>30</td>
</tr>
<tr>
<td>Squat Test</td>
<td>Yes</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>19</td>
</tr>
<tr>
<td>Lachmann Test</td>
<td>Yes</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>24</td>
</tr>
<tr>
<td>Anterior drawer test</td>
<td>Yes</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>19</td>
</tr>
<tr>
<td>Posterior drawer Test</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Posterior Sag Test</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Varus stress test</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Valgus stress test</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45</td>
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</tbody>
</table>

Discussion

Thorough clinical assessment is important and necessary for diagnosis of knee ligament injuries but stress examination is painful so they are not accurate in acute injuries, so for this reason MRI is asked for diagnosis of acute knee injuries. Arthrography and arthroscopy increase accuracy of diagnosis but they are invasive and have some complications. Diagnostic arthroscopy is a recent essential advance which increases the accuracy of diagnosis of knee injuries from 64% to 94%. Arthroscopy is an invasive procedure with complications like infection, bleeding, neurovascular injury, complex regional pain syndrome and breakage of instruments along with complications of anesthesia.

Two studies which were conducted previously for correct diagnosis rates of clinical diagnosis have shown the accuracy of it in about 80% cases.

Some studies have shown that accuracy of clinical diagnosis is lower than that and is dependent up on number of lesions present. All these studies have small
In this study diagnostic accuracy of clinical examination for diagnosis of medial meniscus tear is 70.83% sensitive and 19.05% specific. While positive predictive value and negative predictive values are 50% and 36.36%. Clinical examination has low specificity and negative predictive value for the diagnosis of medial meniscal tear. For lateral meniscal tear sensitivity and specificity of clinical examination are 16.67% and 89.74% respectively. While positive predictive value and negative predictive values are 20% and 87.5% respectively. In this scenario clinical examination has low sensitivity and low positive predictive value. For anterior cruciate ligament injury sensitivity and specificity of clinical examination are 72.735 and 66.67% respectively. While positive predictive value and negative predictive values are 85.715 and 47.065 respectively. In this scenario clinical examination has high sensitivity and high positive predictive value.

In a study conducted by Richard Nickinson, he has shown the sensitivity and specificity of anterior cruciate ligament rupture 86% and 98% respectively. Sensitivity and specificity of medial meniscal tear was 92% and 97% respectively. Sensitivity and specificity of lateral meniscal tear was 54% and 96% respectively. Sensitivity and specificity of clinical examination for anterior cruciate ligament, medial meniscus and lateral meniscus are lower in our study as compare to that revealed by Richard Nickinson.

In the Iranian study accuracy of clinical diagnosis was checked and revealed that clinical examination is 85.7% sensitive and 95.9% specific for diagnosis of anterior cruciate ligament rupture, 100% sensitive and 95.6% specific for diagnosis of medial meniscus tear, 84.6% sensitive and 91.2% specific for lateral meniscus tear. In this Iranian study, clinical diagnosis for meniscal injuries is more sensitive and specific as reported in our study.

In another study conducted by Sharma in which he compared the clinical examination versus arthroscopy in knee injuries has described that clinical examination is 96.1% sensitive and 33.3% specific for medial meniscus tear and 38.4% sensitive and 96.4% specific for lateral meniscus tear. However our results are consistent with the results reported by Sharma as the same trend was observed in his results i.e. for medial meniscus tear he stated that clinical examination was highly sensitive with low specificity and for lateral meniscus, clinical examination was less sensitive with high specificity.

In a study of Gupta, he reported sensitivity and specificity of clinical examination for anterior cruciate ligament tear 88% and 100% respectively, sensitivity and specificity of medial meniscus tear 70% and 80% respectively and sensitivity and specificity of lateral meniscus tear 50% and 94% respectively.

The reason for this difference is a false assumption that arthroscopic diagnosis is always a true diagnosis but the published data reveals 95% accuracy of arthroscopy that is why few arthroscopic diagnoses may not be correct especially by an inexperienced surgeons. In this study preoperative clinical diagnoses were made by a consultant in knee clinic. This has therefore increased the accuracy of the results than those with other studies.

The confidence in the clinical diagnosis of knee injury is very essential. Mode of injury, thorough history and symptoms are reliable indicators of the knee pathology. Accuracy of clinical diagnosis can be increased by the experience and the clinical diagnosis to be made with enough confidence for justification of knee arthroscopy.

Conclusion

Results of this study clearly revealed that diagnostic accuracy of clinical examination for the diagnosis of internal derangement of knee shows variability. Clinical examination findings have high sensitivity for diagnosis of MMT and ACL injuries while it shows very low sensitivity for LMT. While specificity of clinical examination for diagnosing LMT and ACL was high but for MMT was low.

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