

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–1, 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

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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.

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 injured 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 ruptures, 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. Magnetic resonance imaging is far from incapable of error for diagnosing knee injuries, so, there is reason to prefer arthroscopy in those patients who are strongly suspicious of having knee injuries. Arthroscopy is the frequently performed method for diagnostic and therapeutic purposes in knee injuries, having 95% accuracy as reported in some previous studies.⁵ If the arthroscopy is performed by an experienced knee arthroscopic surgeon it is the gold standard method of diagnosis. 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 diagnosis, we decided to conduct this study to check if clinical examination has high accuracy for diagnosing

knee injuries and we can proceed directly to arthroscopic 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 responding to non-surgical treatment were selected from outpatient department (OPD). After taking informed consent from these patients, a clinical diagnosis of meniscal, anterior cruciate ligament, posterior cruciate ligament, medial collateral ligament and lateral collateral ligament injury of knee was made, confirmation with 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. Findings of both clinical examination and arthroscopy were documented on prescribed form, proforma and transferred to Microsoft excel file. Clinical examination of patient was performed by researcher and arthroscopy was performed by specialized knee arthroscopic surgeon. Procedure was performed after giving spinal or general anesthesia with preoperative antibiotic 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 patients was 29.21 ± 8.85 and 33.66 ± 6.35 years respectively. 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 asking 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 patients right knee was affected. Principle complaints experienced 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 patients and Quadriceps wasting was present in all pati-

Table 1: Principle Complaints of Patients.

Symptoms		Frequency	Percentage
Pain	Yes	45	100
	No	0	0
Swelling	Yes	5	11.1
	No	40	88.9
Fever	Yes	0	0
	No	45	100
Clicking	Yes	19	42.2
	No	26	57.8
Giving Away	Yes	21	46.7
	No	24	53.3
Locking	Yes	6	13.3
	No	39	86.7

Table 2: Special Clinical Tests for Knee Injuries.

		Frequency	Percentage
McMurray Test	Yes	22	48.9
	No	23	51.1
Aplay grinding Test	Yes	15	33.3
	No	30	66.7
Squat Test	Yes	26	57.8
	No	19	42.2
Lachmann Test	Yes	21	46.7
	No	24	53.3
Anterior drawer test	Yes	26	57.8
	No	19	42.2
Posterior drawer Test	Yes	0	0
	No	45	100
Posterior Sag Test	Yes	0	0
	No	45	100
Varus stress test	Yes	0	0
	No	45	100
Valgus stress test	Yes	0	0
	No	45	100

ents. 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 McMurray 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%.

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.⁶

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.⁷

Two studies which were conducted previously for correct diagnosis rates of clinical diagnosis have shown the accuracy of it in about 80% cases.^{8,5}

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

sample size which limit their applicability. The literature review has shown that available meta – analyses has focused over diagnosis of traumatic knee derangements and there are no review articles available which evaluate the accuracy of clinical diagnosis of all kinds of knee pathologies.⁹⁻¹¹

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.⁵

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.¹² 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.¹³ 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.¹⁴

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.^{15,16}

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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