

Validity of Clinical Assessment In Comparison To Magnetic Resonance Imaging in Diagnosis of Medial Meniscal Tear in a Sample Of Iraqi Patients: A Single Center Study

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Abstract:

Background: Medial meniscus injury is common in young males with knee trauma so early clinical diagnosis is important. The aim of this study was to evaluate the validity of clinical assessment in comparison to magnetic resonance imaging (MRI) in diagnosis of medial meniscal tear in a sample of Iraqi patients.

Methods: A total of 50 patient with knee pain involved in this cross sectional study. Full history was taken and complete clinical examination was done. Clinical assessment for medial meniscal tear included history of trauma, medial knee joint pain and tenderness, McMerry test, and Apply test. Magnetic resonance imaging (MRI) of the affected knee joint was done for all patients and read by a blinded single radiologist.

Results: of 50 patients studied: 36 (72%) were males. Mean age of the patients was 35.44 ± 12.09 years. Clinical meniscal tear was positive in 41 (82%) patient while MRI meniscal tear positive was present in 44 (88%). Both clinically positive meniscal tear and MRI positive tear were present in 37 patients. Clinical assessment had a sensitivity of (84.09 %), diagnostic accuracy (78 %), positive predictive value (90.24 %), specificity (33.33 %), and negative predictive value (22.22%).

Conclusions: Clinical assessment is a valid, easy, and simple tool in diagnosis of medial meniscal injury in Iraqi patients with high sensitivity, high diagnostic accuracy, and very high positive predictive value.

Keywords: Medial meniscal injury, Clinical assessment, Magnetic resonance imaging

I. Introduction

The menisci are semilunar structures which are localized in the knee joint. Meniscus tears are an extremely common cause of knee pain in the general population and increase with increasing age [1]. Menisci are commonly injured in knee trauma especially in road traffic accidents and amongst young males in the sports field [2]. Medial Meniscus is more commonly injured than lateral Meniscus [3].

Individuals who experience a meniscus tear usually complain of pain and swelling as their primary symptoms. It is important to make an accurate diagnosis of meniscus tears so that the appropriate treatment can be given. A detailed history and physical examination can help to differentiate patients who have a meniscus tear from those whose knee pain arises from other conditions [4].

The MRI is frequently advised to evaluate clinically suspected cases of meniscal injuries and has often been regarded as the noninvasive alternative to diagnostic arthroscopy to support the diagnosis for meniscal injuries [5].

The diagnostic accuracy of clinical assessment for meniscal tears has often been questioned. A review of the available literature reveals conflicting results as to their usefulness [6–10]. The aim of this study was to evaluate the validity of clinical assessment in comparison to MRI in diagnosis of medial meniscal tears in a sample of Iraqi patients.

II. Patients And Methods

Study design

This cross sectional study conducted in Rheumatology and Orthopedic units in Baghdad Teaching Hospital from August 2013 to August 2014. Informed consent was obtained from each participant included in this study. Ethical approval was obtained from the Ethics Committee of Baghdad University, College of Medicine, Medical Department.

Sample selection

Patients with knee pain were included in the study. Patients were excluded if they had other comorbid systemic diseases, taking medications like corticosteroids and diuretics or evidence of loose bodies on plain radiographs, or any prior surgery that may cause knee pain.

Clinical and Magnetic resonance evaluation

A questionnaire form was filled for each patient consisted of age, sex, body mass index, and clinical assessment criteria included history of trauma, knee pain, tender joint line, positive McMurray’s test, and positive Apply test for meniscal injury performed by an orthopedist. MRI of the affected knee joint was performed using extremity coil with Philips Achieva 1.5 tesla MRI device using a standard imaging protocol in sagittal, coronal and axial planes. No contrast media were administered. A single radiologist reported on all MRI scans blinded to the clinical assessment for diagnosis of medial meniscal tear.

Statistical analysis

Statistical software (SPSS version 22, IBM, USA) was used for data input and analysis. Shapiro Wilk test was used to assess the normal distribution of continuous variables. Normally distributed continuous variables were presented as mean ± standard deviation (SD) and categorical variables were presented as numbers and percentiles. Sensitivity, specificity, positive predictive, negative predictive values and accuracy was calculated using the 2×2 table.

III. Results

A total of 50 patients involved in the study with mean age of (35.44 ± 12.09) years, of those males were 36 (72%). The mean BMI was (26.99 ± 3.70) kg/m². Other patients’ baseline characteristics were shown in table 1.

Patients with both clinically positive and by MRI positive for medial meniscal tear were 37 patients as shown in table 2.

Positive clinical assessment for diagnosis of medial meniscal tear had high sensitivity (84.09 %), high diagnostic accuracy (78 %), very high positive predictive value (90.24 %), but relatively low specificity (33.33 %) and negative predictive value (22.22%)

Table1: Baseline characteristics of 50 patients

Variable	Value
Age (Mean± SD), year	35.44 ± 12.09
Male n(%)	36 (72)
BMI (Mean± SD), kg/m ²	26.99 ± 3.70
Hx of trauma +ven(%)	24 (48)
Hx of +ve Knee joint pain n(%)	45(90)
Knee joint tenderness n(%)	45 (90)
McMerry test +ven(%)	31 (62)
Apply test +ven(%)	48 (96)
Clinical meniscal injury +ve n(%)	41 (82)
MRI meniscal injury +ven(%)	44 (88)

SD, standard deviation; BMI, body mass index; MRI, magnetic resonance imaging; n, number

Table2: Relationship of clinical and MRI findings in medial meniscal injuries

Medial meniscal tear	MRI positive	MRI negative
Clinically positive n.	37	4
Clinically negative n.	7	2

MRI, magnetic resonance imaging; n, number

Table3: Validity parameters of clinical assessment in diagnosis of medial meniscal injury

Parameter	Sensitivity	Specificity	Accuracy	PPV	NPV
Positive Clinical assessment of medial meniscal injury	84.09 %	33.33 %	78 %	90.24 %	22.22%

PPV, positive predictive value; NPV, negative predictive value.

IV. Discussion

Meniscal injuries are recognized as a cause of significant musculoskeletal morbidity. The menisci are vital for the normal function and long-term health of the knee joint [11].

This study aimed to evaluate the validity of clinical assessment in comparison to MRI in diagnosis of medial meniscal tear in a sample of Iraqi patients. It showed that clinical assessment had high sensitivity, high diagnostic accuracy, and very high PPV, but relatively with low specificity and low NPV.

The possible mechanisms of meniscal tears are typically thought to be initiated by coupled compression and twisting movements. It occur due to a shear force between the femur and tibia. In younger patients, this is typically a twisting force on a weight-loaded flexed knee. In older patients, tears are generally due to degeneration associated with ageing and tend to be horizontal tears [12]

This study showed that clinical assessment of medial meniscal injury had a sensitivity of (84.09 %), diagnostic accuracy (78 %), and PPV (90.24 %) specificity (33.33 %) and NPV (22.22%) in comparison to MRI. This indicates that clinical assessment is a valid tool for diagnosis of medial meniscal injury and will help in early selection of patients who need further investigation with MRI and whether conservative management or surgical treatment is required. The treatment of meniscal injury is important in eliminating clinical symptoms and improving long-term clinical efficacy.

Many studies have shown no significant differences in the clinical and MRI diagnosis of meniscal tears [13- 15]. One study even showed that, when the MRI was normal, high clinical suspicion and a skilled clinical examination were more reliable [16]. Mohan et al., in their retrospective series of 130 patients, reported that diagnostic accuracy of clinical examination was 88% for medial meniscal tears and they concluded that clinical diagnosis of medial meniscal tears is as reliable as the magnetic resonance imaging (MRI) scan [17]. Rose et al. and Boden et al. found that clinical examination is as accurate as MRI in diagnosing meniscal and ACL injuries [18, 19].

The main limitation of the current study is the small number of studied patients which can be solved by larger prospective studies. However, this study has the advantage of being performed prospectively, while most of the previous studies were retrospective. In addition, this study has points of strength like strict inclusion and exclusion criteria, and defined data measurement and collection.

In conclusion, clinical assessment is a valid, easy, practical, and simple tool in diagnosis of medial meniscal injury in Iraqi patients with high sensitivity, high diagnostic accuracy, and very high positive predictive value. This highlights the importance of clinical assessment in early diagnosis of meniscal injuries and selecting patients for MRI scan which will help orthopedic surgeons in selecting proper therapy for their patients.

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