

ORIGINAL ARTICLE**McMurray's Test and Joint Line Tenderness for Medial Meniscus Tear: Are They Accurate?****Yogendra Gupta¹, Deepak Mahara², Arjun Lamichhane²****ABSTRACT**

BACKGROUND: Meniscus tears are the most common injury of the knee. The McMurray's test and Joint line tenderness for diagnosing meniscus tear have been widely tested, but results reported by different authors vary. The wide variations reported have an impact on clinical decision concerning whether to go for other diagnostic tests before going for diagnostic arthroscopy, which is considered as the gold standard. The purpose of this study was to determine the diagnostic value of Joint line tenderness and McMurray's test, as clinical signs, to diagnose underlying medial meniscus tears.

METHODS: This was a prospective observational study done in Tribhuvan University Teaching Hospital. Patients undergoing knee arthroscopy were included in the study period of one year (from February 2011 to January 2012). Each patient was clinically examined with McMurray's test and joint line tenderness. The findings were then matched by the arthroscopic findings. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy were then calculated.

RESULTS: The sensitivity, specificity, positive predictive value, negative predictive value and accuracy for medial joint line tenderness in diagnosing medial meniscus tear were 50%, 61.7%, 51.8%, 60% and 56.45% respectively. The result was insignificant (p value=0.352). The sensitivity, specificity, positive predictive value, negative predictive value and accuracy for McMurray's test for diagnosing medial meniscus tear were 54%, 79%, 68%, 67.50% and 67.74% respectively. The result was significant (p value=0.007).

CONCLUSION: Clinical tests like McMurray and joint line tenderness have low diagnostic value when applied individually. They may be useful when combined together with the background of clinical history. The decision to scope the knee should not be solely taken on the results of clinical tests.

KEYWORDS: Medial meniscus, McMurray's test, Joint line tenderness

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INTRODUCTION

Meniscal tears are the most common injury of the knee (1). Medial meniscus tears are generally seen more frequently than tears of the lateral meniscus, with a ratio of approximately 2:1 (2). Meniscal tears may occur in acute knee injuries in younger patients or as part of a degenerative process in older individuals. The acute tears frequently result from sports injuries where there is a twisting motion on the partially flexed, weight-bearing knee (3).

The diagnosis of meniscus tear can frequently be made from a careful history, physical

examination and appropriate diagnostic tests. The onset of symptoms and mechanism of injury are often clues to the diagnosis. The syndromes caused by tears of the menisci can be divided into two groups: that in which there is locking and the diagnosis is clear and that in which locking is absent and the diagnosis is more difficult. In the first group, locking has been classically described. However, locking may not be recognized unless the injured knee is compared with the opposite normal knee, which should exhibit 5 to 10 degrees of recurvatum. If a patient does not have locking, the following signs can be important: effusion

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atrophy of the quadriceps, tenderness over the joint line (or the meniscus) and reproduction of a click or pain by manipulative maneuvers during the physical examination.

Probably, the most important physical finding is localized tenderness along the medial or lateral joint line or over the periphery of the meniscus. This is most often located posteromedially or posterolaterally, since most meniscus tears are in the posterior horn areas (4). The eponymous test that is commonly performed as part of the routine knee examination in order to test for the presence of a meniscus tear is McMurray's test, which was described by McMurray in 1942 in the *British Journal of Surgery* (5).

The McMurray's test and joint line tenderness for diagnosing meniscus tear have been widely tested, but results from different authors vary. The wide variations reported have an impact on clinical decision regarding whether to go for other diagnostic tests like Magnetic Resonance Imaging (MRI) before going for diagnostic arthroscopy, which is considered as the gold standard (6) also the most commonly performed knee joint surgery(7).

We conducted a prospective study to evaluate the diagnostic value of McMurray's test and joint line tenderness for diagnosing medial meniscus tear. We hypothesized that the clinical tests of McMurray's and joint line tenderness are appropriate for diagnosing medial meniscus tear.

MATERIALS AND METHODS

This was a prospective study done in Tribhuvan University Teaching Hospital under the Department of Orthopedics and Trauma, from February 2011 to January 2012. All consecutive patients undergoing knee arthroscopy for knee symptoms (internal derangement of knee) were included. Cases with multiligament injury were excluded. Eligible patients were requested for written informed consent before enrolling in the study.

Patients who enrolled in the study underwent a short interview regarding their symptoms, mode of injury, duration of symptoms and other demographic questionnaire. Each patient was clinically examined with McMurray's test and joint line tenderness for clinical diagnosis of medial meniscus tear. The presence of pain and/or

click/snap/clunk/thud was considered positive for the McMurray's test. Joint line tenderness was tested in 90 degree of knee flexion. The examination was performed by one of the authors (DPM/APL) who was blinded to the available imaging report. Both DPM and APL are experienced orthopedic surgeons working in tertiary care center and are fellow of sports medicine. Either author, DPM or APL, performed the arthroscopies. The clinical findings were then matched with arthroscopic findings. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy were then calculated by forming two-by-two cross table and using standard formula.

Analysis of data was done using the SPSS 16 package. The statistical significance of observations were tested by the Chi square test and when needed, logistic regression analysis was performed. P-value of <0.05 was considered significant.

RESULTS

A total of 66 patients were included in the study, males making 62.90% of the patients. The ages of the patients ranged from 11-70 years with mean age being 27.35 ± 11.70 years. Most of the patients (54.80%) belonged to 20-30 years age group while those above 50 years account only for 4.80% of the patients.

Sports related injury was seen in 21(33.9%) patients, 42.90% had contact injury and 57.10% had non-contact injury. Other than sports related injury, road traffic accident was 11(17.70%), fall from height accounted for 12(19.40%), injury resulting from squatting or getting up from squatting position occurred in 3(4.80%), spontaneous onset was 14(22.60%) and other injury pattern formed 1(1.60%). Duration of presentation varied from 1 week to 96 months with an average of 19.18 months.. Twenty-eight patients (45.20%) underwent arthroscopy in the left knee whereas the rest had it in right knee. Pain was the most common cause of presentation seen in 41(36.60%) patients. Other causes of presentation were giving away in 31(27.70%), swelling and locking each in 16(14.30%) and snapping symptoms in 6(5.40%) cases.

We compared the results of the medial joint line tenderness and McMurray's test for medial meniscus with the arthroscopy results (Table 1).

The sensitivity, specificity, positive predictive value, negative predictive value and accuracy for medial joint line tenderness in diagnosing medial meniscus tear were 50%, 61.7%, 51.8%, 60% and

56.45% respectively. The result was tested for significance using chi square test and it was found to be not significant (p value=0.352).

Table 1: Medial joint line tenderness and meniscus tear (Arthroscopic diagnosis).

Medial joint line tenderness	Arthroscopic medial meniscus tear		Total
	Present	absent	
Positive	14	13	27
Negative	14	21	35
Total	28	34	62

Similarly, the sensitivity, specificity, positive predictive value, negative predictive value and accuracy for McMurray's test for diagnosing medial meniscus tear were 54%, 79%, 68%,

67.50% and 67.74% respectively (Table 2). The results showed significant correlation when tested by Chi square test (p value=0.007).

Table 2: McMurray's test for Medial meniscus tear and final arthroscopic diagnosis.

Mc Murray's test for Medial meniscus tear	Arthroscopic medial meniscus tear		Total
	Present	Absent	
Positive	15	7	22
Negative	13	27	40
Total	28	34	62

DISCUSSION

In our study, the sensitivity, specificity, positive predictive value, negative predictive value and accuracy for medial joint line tenderness in diagnosing medial meniscus tear were 50%, 61.7%, 51.8%, 60% and 56.45% respectively. The meniscus itself is without nerve fibers except at its periphery. Therefore, the tenderness or pain is related to synovitis in the adjacent capsular and synovial tissues (4). In a study by Osman (4) with 54 knees to validate joint line tenderness, the sensitivity, specificity, positive predictive value, negative predictive value and accuracy found to be 86%, 67%, 59%, 90% and 74% respectively. The author concluded that the test is inferior in identifying medial meniscus tear in comparison to lateral meniscus. Similarly, in a study by Rose RE (8), the sensitivity, specificity,

positive predictive value, negative predictive value and accuracy were found to be 92%, 78.48%, 73%, 93% and 83.72% respectively. Wadey et al (9) in their study with 71 patients showed the sensitivity of 84.6%, specificity of 31.2%, positive predictive value 60% and negative predictive value of 62.5%. However, this result was for both medial and lateral joint line. Eren OT (10) in his study showed that the joint line tenderness as a test for lateral meniscus tears is accurate (96%), sensitive (89%), and specific (97%). However, for medial meniscus tears, rates are lower.

The higher diagnostic values of joint line tenderness in the above mentioned studies than our study are probably due to the fact that our data was heterogeneous for wide variety of possible internal derangement. Particularly, cases with chondral lesions on medial tibial or femoral

condyles give high false positive results. In acute or sub-acute knee injuries, bone bruises also give false positive result. The presence of mechanical symptoms with absence of pain, particularly in patient presenting late may be one of the causes for decreased diagnostic value of this clinical sign.

The Mc Murray's test has been widely tested, but results of various authors vary (Table 3). In the meta-analysis for validation of this test by Wayne H et al (11), sensitivity varied from 29-88% and specificity from 50-98%. Variation in the results in other studies as compared to ours can be due to various reasons. There is obvious variation in the skill level of orthopedic surgeons and inter observer variability definitely affects the results. The findings of other studies may have varied due to variations in the size and type of study populations. One factor that has much influence on the outcome of a test is the way the test is described and applied and the criterion used for defining the test positive cases. Pain, thud, click or

clunk or the combination of one or more of these symptoms have been taken as criterion for a test to be positive. In a study by Evans et al (16), thud has been used as the defining criterion and so it has high specificity and very low sensitivity. Studies which have taken pain and click/clunk as defining criterion, as we have taken, have nearly similar results as ours (12, 13). The different types of tear pattern can also have impact on the outcome of the test as only peripheral parts of meniscus and posterior horn have welldefined pain receptors. Peripheral tears and posterior horn tears are more likely to give positive results (15). Sensitivity figures ranged from 16% to 88% across the reviewed papers, indicating that a torn meniscus is likely to be missed in many patients. However, relatively high specificity figures (50–96%) indicate that false positive tests are relatively low. When a test is positive, it is likely that the patient actually does have a torn meniscus.

Table 3: Diagnostic values of McMurray's test in different studies

Study	No of cases	Sensitivity	Specificity	PPV	NPV	Accuracy
Rui Yan et al(12)	262	75.80	76.80	95	35.10	76
Akseki et al(13)	150	67	69	80	53	66
Karachalios et al(14)	213	48	94	--	--	78
Corea et al(15)	93	65	93	--	--	--
Evans et al(16)	104	16	96	83	--	--
Our study	62	54	79	68	67.50	67.74

The effect of the presence of an associated anterior cruciate ligament (ACL) deficiency can have influence on the test. We did not test our result on the background of presence or absence of ACL insufficiency. Kurosaka et al (17) found that diagnostic accuracy is lessened in patients with multiple pathologies. In contrast, Akseki et al(13) found that there was no reduction in diagnostic accuracy with an associated tear of the ACL. In combined acute ACL injury and meniscus tears, Speziali A et al(18) have found a decreased accuracy of the clinical investigation. Ercin E et al (19) while analyzing cases indicate that clinical examination by an experienced examiner using multiple meniscus tests was sufficient for a diagnosis of a meniscus tear. The injury was

classified as a meniscus tear if there were two positive tests out of seven tests. Fowler PJ et al (20) have also shown that no single test is predictive for the diagnosis of a meniscus tear; a combination of tests should be used. The presence of anterior cruciate ligament pathology will render these tests less effective for diagnosis of meniscus pathology. Similarly, Konan (21) has also showed increased diagnostic accuracy with combination of tests.

There were a few limitations in our study. These include a small sample size, interobserver variability and possible effect of the duration of symptoms on the test results. Also, the different pain perception level of the patients could be a potential limiting factor affecting the test results.

Clinical tests like McMurray and joint line tenderness have low diagnostic value when applied individually, although McMurray's test has better accuracy than joint line tenderness. They may be useful when combined together with the background of clinical history. The decision to scope the knee should not be solely taken on the results of clinical tests.

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