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Dr. Korpu Venkata Ram Kishore
Senior Resident, Department of
Orthopaedics, Sri Manakula
Vinayagar Medical College and
Hospital, Kalitheerthalkuppam,
Pondicherry, Tamil Nadu, India

Dr. Victor Moirangthem
Associate Professor, Department
of Orthopaedics, Chettinad
Hospital & Research Institute,
Kelambakkam, Kanchipuram,
Tamil Nadu, India

M Narayana Reddy
Head of Department,
Department of Orthopaedics,
Chettinad Hospital & Research
Institute, Kelambakkam,
Kanchipuram, Tamil Nadu,
India

**Dr. Aravindan Tharakad
Satchidanandan**
Senior Resident, Department of
Orthopaedics, Chettinad
Hospital & Research Institute,
Kelambakkam, Kanchipuram,
Tamil Nadu, India

Correspondence

Dr. Victor Moirangthem
Associate Professor, Department
of Orthopaedics, Chettinad
Hospital & Research Institute,
Kelambakkam, Kanchipuram,
Tamil Nadu, India

Clinical accuracy of McMurray test and Thessaly test in meniscal injuries and their correlation with MRI

**Dr. Korpu Venkata Ram Kishore, Dr. Victor Moirangthem, M Narayana
Reddy and Dr. Aravindan Tharakad Satchidanandan**

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Abstract

Background: The meniscus of the knee are vital for load bearing and shock absorption. Meniscal injury are common in young active adults who engaged in athletic activities. Following meniscal injury the presentation may vary from mild joint discomfort to frank locking of the joint. This creates a lot of morbidity to the patient. Various clinical tests are available for examining the integrity of the meniscus. The Thessaly test and McMurray test are very useful and cheap screening tools for identifying patient with suspected meniscal injuries. Before advising any patient presenting with traumatic knee pain for expensive investigations like MRI for suspected meniscus injury, these two clinical tests can serve as useful adjuncts in the management of such patients as not all meniscus tear need invasive treatment.

Objectives: To assess the validity of a new clinical test (Thessaly) as a means of diagnosing meniscal tears of the knee by comparing the findings of Thessaly test with those of MRI and /or arthroscopy.

Materials and Methods: This cross-sectional study was done between June 2016 to June 2017 at chettinad hospital & research institute on consecutive patients who presented with suspected meniscal injury. These patients were screened for meniscal injuries by performing the McMurray and Thessaly test. Patients with strong clinical suspicion for meniscal tear were then advised MRI of the injured knee. The findings of MRI were then correlated with the clinical findings to measure the diagnostic accuracy.

Results: A total of 71 patients were included in the study. The mean of age was 29.77 years with a standard deviation of 7.8. Injury during sports activity accounting for 56.34% of the study sample was the most common mode of injury. The McMurray test was positive in 66.20% and Negative in 33.80% of the study population. The Thessaly test at 5 degree of knee flexion was positive in 63.38% and Negative in 36.62% of the study population. The Thessaly test at 20 degrees of knee flexion was positive in 73.24% and Negative in 26.76% of the study population. Thessaly test in 20 degree flexion is more sensitive than McMurray test for diagnosis of meniscal lesions. Whereas McMurray test has better specificity and better predictive values compared to Thessaly test.

Conclusions: Both McMurray test and Thessaly test either singly or combined cannot be used as an alternative to MRI in confirming the diagnosis of meniscal lesions. However, they can be used as an effective screening tool in the identification of patients with meniscal lesions who may benefit from further investigations like MRI.

Keywords: meniscus, McMurray test, thessaly test, MRI knee, diagnostic accuracy

Introduction

Injuries of the meniscus are common among people such as athletes when they are fully bearing their body weight and just happen to twist their leg [1]. Injuries of the Menisci are one of the common surgical indications for the morbidity of the knee [1]. Acute tears occur usually, following a rotational and compressive load when the knee changes from a position of flexion to extension. Meniscal tears cause derangement of the knee, which may be due to traumatic or degenerative or other reasons. The Vital functions of Menisci are Bearing of Load and also shock absorption. The circumferential fibers of the collagen bundles of Menisci are mainly responsible for this function.

A significant amount of Pain and Restriction of movements can be caused by Torn menisci and associated ligamentous structures. A Provisional diagnosis of Meniscal injury in a Primary care setting is made mainly based on Clinical history, Physical examination, Mechanism of

Injury [2, 3]. But the symptoms are not specific and most of the times vague.

Also, subjects with Partial tears, Anterior or horizontal tears do not experience any interference with their normal day to day knee mechanism. A superficial examination of the knee may not be able to produce an abnormal finding and there may be the need for various provocative maneuvers to elicit the symptoms from meniscus which is torn.

Usually, subjects describe a tearing or a popping sensation at the time of injury or may present later with complaints of locking or catching of knee.

Aims and Objectives

To assess the validity of a new clinical test (Thessaly) as a means of diagnosing meniscal tears of the knee by comparing the findings of Thessaly test with those of MRI and /or arthroscopy.

Materials & Methods

Study design: The current study was a cross sectional study

Study setting: The study was conducted in the Department of Orthopedics, Chettinad Hospital, and research institute, Chennai, which is a tertiary care teaching hospital

Study population: The study population included all the patients attending the study setting, with suspected meniscal injury of knee joint

Inclusion criteria

1. Patient should be able to stand on single leg
2. Patient neurology in both lower limbs should be intact
3. Age group between 15-50
4. Knee injuries only

Exclusion criteria

1. Degenerative conditions of knee
2. Acute knee injuries with gross instability and pain

Study period: The data collection for the study was done between June 2016 to June 2017 (One year).

Ethical considerations

The study was approved by institutional human ethics committee of Chettinad hospital and research institute. Informed written consent was obtained from all the participants. Confidentiality of the study participants was maintained throughout the study.

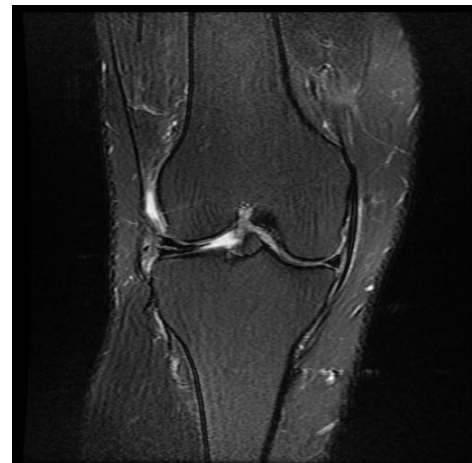
Data collection tools: The data was collected using a structured study proforma

Methodology: After obtaining the informed written consent, each participant underwent detailed evaluation by clinical history, general examination and examination of the affected joint. The patient was asked to stand on a single leg. Thessaly test was performed in 5° and 20° of flexion, the test was performed first in the normal knee and then affected knee (The examiner supports the patient by holding his or her outstretched hands while the patient stands flatfooted on the floor. The patient then rotates his or her knee and body, internally and externally, three times, keeping the knee at both 5 degrees and 20-degree flexion). McMurray test was

performed. Patients who tested positive for either clinical tests or both were then advised to get MRI of the affected knee for confirmation.



The thessaly test done sequentially in 5 and 20 degrees of knee flexion.



MRI showing a tear in the lateral meniscus

Results

The mean age was 29.77 ±7.8 (range – 20 to 48) years. Injury during sports activity was the most common mode of injury 56.34% followed by slip and fall 22.54% and road traffic accident 21.13%. The McMurray test was positive in 66.20% of patients. The Thessaly 5 degree test was positive in 63.38% of patients. The Thessaly 20 degree test was positive in 73.24% of patients. MRI identified meniscal lesion in 64.79% of the study population. The medial meniscus posterior is the most frequent lesion 40.85% followed by lateral meniscus 21.13%, medial meniscus body 18.31%, medial meniscus anterior 15.49%, lateral meniscus anterior 8.45% and lateral meniscus body 5.63%.

Table 1: Association of MRI report with McMurray of study population (N=71)

McMurray	MRI report		Chi square	P-value
	Positive	Negative		
Positive	33 (71.74%)	14 (56%)	1.793	0.181
Negative	13 (28.26%)	11 (44%)		

Table 2: Predictive validity of McMurray as compared to MRI Report (N=71)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	71.7%	58.73%	84.8%
Specificity	44.0%	24.54%	63.5%
False positive rate	56.0%	36.54%	75.5%
False negative rate	28.3%	15.25%	41.3%
Positive predictive value	70.2%	57.14%	83.3%
Negative predictive value	45.8%	25.90%	65.8%
Diagnostic accuracy	62.0%	50.68%	73.3%

Table 6: Predictive validity of Thessaly 20 as compared to MRI Report (N=71)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	73.9%	61.22%	86.6%
Specificity	28.0%	10.40%	45.6%
False positive rate	72.0%	54.40%	89.6%
False negative rate	26.1%	13.40%	38.8%
Positive predictive value	65.4%	52.45%	78.3%
Negative predictive value	36.8%	15.15%	58.5%
Diagnostic accuracy	57.7%	46.26%	69.2%

Table 3: Association of MRI report with Thessaly 5 degree of study population (N= 71)

Thessaly 5 degree	MRI report		Chi square	P-value
	Positive	Negative		
Positive	29 (63.04%)	16 (64%)	0.006	0.936
Negative	17 (36.96%)	9 (36%)		

Table 7: Association of MRI report with McMurray and T5 positive of study population (N= 71)

McMurray and T5 positive	MRI report		Chi square	P-value
	Positive	Negative		
Positive	18 (39.13%)	6 (24%)	1.657	0.198
Negative	28 (60.87%)	19 (76%)		

Table 4: Predictive validity of Thessaly5 as compared to MRI Report (N=71)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	63.0%	49.09%	77.0%
Specificity	36.0%	17.18%	54.8%
False positive rate	64.0%	45.18%	82.8%
False negative rate	37.0%	23.01%	50.9%
Positive predictive value	64.4%	50.46%	78.4%
Negative predictive value	34.6%	16.33%	52.9%
Diagnostic accuracy	53.5%	41.92%	65.1%

Table 8: Predictive validity of McMurray and T5 positive as compared to MRI Report (N=71)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	39.1%	25.03%	53.2%
Specificity	76.0%	59.26%	92.7%
False positive rate	24.0%	17.18%	40.7%
False negative rate	60.9%	46.77%	75.0%
Positive predictive value	75.0%	57.68%	92.3%
Negative predictive value	40.4%	26.40%	54.5%
Diagnostic accuracy	52.1%	40.49%	63.7%

Table 5: Association of MRI report with Thessaly 20 degree of study population (N=71)

Thessaly 20 degree	MRI report		Chi square	P-value
	Positive	Negative		
Positive	34 (73.91%)	18 (72%)	0.030	0.862
Negative	12 (26.09%)	7 (28%)		

Table 9: Association of MRI report with McMurray and T20 positive of study population (N= 71)

McMurray and T20 positive	MRI report		Chi square	P value
	Positive	Negative		
Positive	21 (45.65%)	9 (36%)	0.618	0.432
Negative	25 (54.35%)	16 (64%)		

Table 10: Predictive validity of McMurray and T20 positive as compared to MRI Report (N=71)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	45.7%	31.26%	60.0%
Specificity	64.0%	45.18%	82.8%
False positive rate	36.0%	17.18%	54.8%
False negative rate	54.3%	39.95%	68.7%
Positive predictive value	70.0%	53.60%	86.4%
Negative predictive value	39.0%	24.09%	54.0%
Diagnostic accuracy	52.1%	40.49%	63.7%

Discussion

Demographic profile

In our study, the subjects were young and the mean age of the study population was 29.77 years with a standard deviation of 7.8 years. The youngest was 20 years old while the oldest was 48 years. 63.38% of the subjects were aged between 15 to 30 years. The results were similar to the study done by Speziali A *et al.* (2016) on 137 subjects, with a mean age of 28.5 years.

Risk factors/ Co-morbidities

Tears of the meniscus usually happen as a result of any trauma or deterioration of the substance material of the meniscus. The usual presentation is an onset of acute pain

which occurs after an injury of twisting type, with a planted foot and a flexed knee. Then after some time, the pain usually subsides. Afterwards, discomfort, effusion in the joint, a thud or a locking sensation may be felt sometimes.

In our study, about 56.34% of the subjects had some sports activity as the mode of their injury. In 22.54% of the subjects, the injury occurred after slip and fall while in 21.13% of subjects, the injury occurred due to RTA. In our study, about 50.70% of subjects were sedentary workers, 36.62% of the subjects were students while only 12.68% of the subjects were sportspersons. Although 50.70% of the subjects who had meniscal tears in our study were sedentary workers, they could have acquired the injury through some sports activity as it was the commonest mode of injury.

Similar to our study, in the study done by Sharma U K *et al.* (2011) [2], out of the 41 subjects with Meniscal tears, the mode of injury was a sport in 12, whereas it was nonsport in 29.

Type of tear

Out of the 71 suspected meniscal tears, MRI, which was the gold standard in our study, detected a tear in 64.79% (46) of the subjects. In our study, Tears of the Medial meniscus was more common than Tears of the Lateral Meniscus. Similar to our study, Ma JZ *et al.* (2016) [21] in their study on cadets at Military school, observed the Medial Meniscus (2:1) was more prone to injury compared to the lateral meniscus.

The validity of the tests

In our study, the diagnostic accuracy of McMurray test was 38% with 95% C.I. of 26.74% to 49.3% while the diagnostic accuracy of Thessaly test at 5 degrees of flexion was 46.5% with 95% C.I. of 34.88% to 58.1%. The diagnostic accuracy of Thessaly test at 20 degrees of flexion was 42.3% with 95% C.I. of 30.76% to 53.7%. So, the most valid test for detection of Meniscal tears in our study was Thessaly test at 20 degrees of flexion. Out of the 71 suspected meniscal tears, McMurray test was positive in 66.20% (47) of the subjects. Out of the 47 subjects tested positive by McMurray test, 33 had a meniscal tear as detected by MRI report. The association between MRI findings and McMurray test for detection of Meniscal tears was not significant in our study with a chi square value of 1.793 ($p=0.181$). In our study, MRI detected 46 (64.79%) out of the 71 suspected meniscal tears.

Similar to our study, Karachalios T *et al.* (2005) [18] recorded a high diagnostic accuracy rate of about 94% with "The Thessaly test at 20 degrees of knee flexion" for detection of medial meniscus tears and 96% for lateral meniscus tears and also low False positives and False Negative rates. They concluded that Thessaly test at 20 degrees of knee flexion can be used as an initial clinical screening test for meniscal tears [18]

Conclusion

1. The sensitivity of when McMurray test was 71.7% (95 CI 58.73% to 84.8%). The sensitivity of Thessaly 5 and Thessaly 20 was 63% (95 CI 49.09% to 77%) and 73.9% (95 CI 61.22% to 86.6%) respectively. Hence it can be concluded that Thessaly 20 is more sensitive than McMurray and Thessaly 5 is less sensitive than mc Murray in diagnosing meniscal injuries when compared against the gold standard.
2. The specificity of McMurray, Thessaly 5 and Thessaly 20 was 44% (95 CI 24.54% to 63.5%), 36% (95 CI 17.18% to 54.8%) and 28% (95 CI 10.40% to 45.6%) respectively. Making Mc Murray the most specific test among the three.
3. The Positive predictive and negative value of McMurray test was 70.2% and 45.8%. The similar values for Thessaly 5 were 64.4% and 34.6% and for Thessaly 20 were 65.4% and 36.8% respectively.
4. When both Murray and Thessaly 5 test positivity was considered as screening positive, the sensitivity was reduced to 39.1%, but specificity was increased to 76% and the total diagnostic accuracy was also improved to 52.1% (95 CI 40.49%_ 63.7%). When both Murray and Thessaly 20 test positivity was considered as screening positive, the sensitivity was 45.7% and specificity was 64% with an overall diagnostic accuracy was 52.1%. Hence it can be concluded that there were no major gains

in sensitivity and specificity achieved by combining the screening tests.

References

1. Howell G. Clinical presentation of the knee. 2002, 1108-13.
2. Sharma UK, Shrestha BK, Rijal S, Bijukachhe B, Barakoti R, Banskota B *et al.* Clinical, MRI and arthroscopic correlation in internal derangement of knee. Kathmandu Univ Med J (KUMJ). 2011; 9(35):174-8.
3. Yan R, Wang H, Yang Z, Ji ZH, Guo YM. Predicted probability of meniscus tears: comparing history and physical examination with MRI. Swiss Med Wkly. 2011; 141:w13314.
4. McMurray TP. The semilunar cartilages. Br J Surg. 1942; 29(116):407-14.
5. Apley AG. The diagnosis of meniscus injuries; some new clinical methods. J Bone Joint Surg Am. 1947; 29(1):78-84.
6. Konan S, Rayan F, Haddad FS. Do physical diagnostic tests accurately detect meniscal tears? Knee Surg Sports Traumatol Arthrosc. 2009; 17(7):806-11.
7. Hegedus EJ, Cook C, Hasselblad V, Goode A, Mccrory DC. Physical examination tests for assessing a torn meniscus in the knee: a systematic review with meta-analysis. J Orthop Sports Phys Ther. 2007; 37(9):541-50.
8. Snoeker BA, Lindeboom R, Zwinderman AH, Vincken PW, Jansen JA, Lucas C. Detecting Meniscal Tears in Primary Care: Reproducibility and Accuracy of 2 Weight-Bearing Tests and 1 Non-Weight-Bearing Test. J Orthop Sports Phys Ther. 2015; 45(9):693-702.
9. Hing W, White S, Reid D, Marshall R. Validity of the McMurray's Test and Modified Versions of the Test: A Systematic Literature Review. J Man Manip Ther. 2009; 17(1):22-35.
10. Muellner T, Weinstabl R, Schabus R, Vecsei V, Kainberger F. The diagnosis of meniscal tears in athletes. A comparison of clinical and magnetic resonance imaging investigations. Am J Sports Med. 1997; 25(1):7-12.
11. Winters K, Tregonning R. Reliability of magnetic resonance imaging of the traumatic knee as determined by arthroscopy. N Z Med J. 2005; 118(1209):U1301.
12. Miller GK. A prospective study comparing the accuracy of the clinical diagnosis of meniscus tear with magnetic resonance imaging and its effect on clinical outcome. Arthroscopy. 1996; 12(4):406-13.
13. Rose NE, Gold SM. A comparison of accuracy between clinical examination and magnetic resonance imaging in the diagnosis of meniscal and anterior cruciate ligament tears. Arthroscopy. 1996; 12(4):398-405.
14. Ercin E, Kaya I, Sungur I, Demirbas E, Ugras AA, Cetinus EM. History, clinical findings, magnetic resonance imaging, and arthroscopic correlation in meniscal lesions. Knee Surg Sports Traumatol Arthrosc. 2012; 20(5):851-6.
15. Corbet D. The Thessaly test. Aust Fam Physician. 2010; 39(4):185.
16. Mirzatoloei F, Yekta Z, Bayazidchi M, Ershadi S, Afshar A. Validation of the Thessaly test for detecting meniscal tears in anterior cruciate deficient knees. Knee. 2010; 17(3):221-3.
17. Yelland M. The Thessaly test at 20 degrees of knee flexion accurately detected meniscal tears. Evid Based Med. 2006; 11(3):90.

18. Karachalios T, Hantes M, Zibis AH, Zachos V, Karantanas AH, Malizos KN. Diagnostic accuracy of a new clinical test (the Thessaly test) for early detection of meniscal tears. *J Bone Joint Surg Am.* 2005; 87(5):955-62.
19. Meserve BB, Cleland JA, Boucher TR. A meta-analysis examining clinical test utilities for assessing meniscal injury. *Clin Rehabil.* 2008; 22(2):143-61.
20. Nielsen AB, Yde J. Epidemiology of acute knee injuries: a prospective hospital investigation. *J Trauma.* 1991; 31(12):1644-8.
21. Ma JZ, Cui SF, Hu F, Lu QJ, Li W. Incidence and Characteristics of Meniscal Injuries in Cadets at a Military School, 2013-2015. *J Athl Train.* 2016; 51(11):876-9.
22. Greis PE, Bardana DD, Holmstrom MC, Burks RT. Meniscal injury: I. Basic science and evaluation. *J Am Acad Orthop Surg.* 2002; 10(3):168-76.