ORIGINAL ARTICLE

Thessaly Test: Its Diagnostic Accuracy for Clinical Diagnosis of Meniscal Knee Injuries Keeping MRI as Gold Standard

ANWAR IMRAN[1], FARMANULLAH KHAN[2], SHUJAAT ALI[3], *AHMAD ZEB[4], AIMON ZIA[5], SAJID AKHTAR[6]*
[1]Medical Officer Orthopaedic Ward DHQ Hospital Charsadda,
[2]Medical Officer KTH Peshawar.,
[3]Medical Officer AHQ Hospital Parachinar,
[4]Medical Officer DHQ Hospital Charsadda,
[5]Consultant Orthopaedic Surgeon, Zia Darman Hospital Mardan,
[6]Senior Registrar SGTH Saido Sharif Swat
Correspondence to Dr. Anwar Imran Email: dranwarbangash@gmail.com

ABSTRACT

Aim: To know/determine the diagnostic accuracy of Thessaly test and its application for clinical diagnosis of meniscal knee injuries keeping magnetic resonance imaging (MRI) as gold standard.
Methods: This cross-sectional study was conducted from Oct 9th 2015 to April 9th 2016 in the Department of Orthopedics and Trauma, Khyber Teaching Hospital, Peshawar. A sample of 223 as per WHO criteria were selected vide non probability consecutive sampling technique. With defined inclusion criteria, exclusion criteria and informed consent the data was collected by applying Thessaly test followed by MRI.
Results: In sample of 223 patients presented male: female was 2.53:1 whereas average age was 31.55 ±10.83 years. Sensitivity and Specificity of Thessaly test was found to be 95.1% and 78.9% respectively while Positive predictive value (PPV) and Negative predictive (NPV) value was 95.7% and 76.9% respectively. The positive likelihood ratio is 4.36 where as negative likelihood ratio is 0.06. Area under ROC curve 0.870, all of these results are pointing towards the efficiency of Thessaly test.
Conclusion: It can be concluded that Thessaly test at angle of 20° (knee flexed) is a sensitive and specific clinical test to reach diagnosis of meniscal knee injuries. Thessaly test can be safely used for screening of patients for suspected meniscal tears followed by MRI for confirmation.
Key words: Thessaly test, Meniscal tears, Knee injuries, Diagnostic accuracy

INTRODUCTION

Knee joint has two menisci, medial and lateral menisci, which serve to transfer load and absorb shock and are the most commonly injured structures in the knee joint.[1] The incidence of meniscal tears ranges from 60 to 70 per 100,000 individuals per year.[2]Its prevalence increases with increasing age ranging from 16% in 50 to 59 years to over 50% in 70 to 90 years[3,4]. In a study published in 2011the prevalence of symptomatic meniscal tear is 40%.Ten loaded rotational movement during extension of knee is the usual reason for the meniscal tears. Various risk factors that can cause meniscal tears are games, advancing age, male gender[5].

Locking of the knee, pain, discomfort, swelling, redness, edematous and clicking sound are among common symptoms of meniscal tears. A detailed history for symptoms and physical examination for signs are required to diagnose meniscal tears in clinical practice, Magnetic Resonance Imaging (MRI) is further used for confirmation with arthroscopy of knee joint. MRI is considered the imaging modality of choice in diagnosing meniscal knee injuries.[6] Joint-line tenderness, McMurray and Apley test are various tools to diagnose meniscal tear clinically. The diagnostic accuracy of Thessaly test is more than other clinical tests for meniscal tears as per results it has shown.[7] The Thessaly test has sensitivity of 64% to 90.3% and specificity of 53% to 97.7% as per studies done previously[1,8].

Received on 30-06-2018
Accepted on 12-12-2018

The low validity of current and previously used clinical tests for diagnosis of meniscal injuries is suggestive of need for further study. Therefore, the basic aim of this study is to find out the diagnostic accuracy of the Thessaly test in contrast to MRI in patients having meniscal tears. MRI being the imaging modality of choice in diagnosing meniscal knee injuries, is used as gold standard to further assess whether a patient diagnosed as having meniscal knee injury on Thessaly test is truly positive for the injury or not. The rationale of this study is to find out diagnostic accuracy of Thessaly test for clinical diagnosis of meniscal knee injuries.

PATIENTS AND METHODS

This Cross-sectional study (validation) study was conducted in Department of Orthopedic and Trauma Khyber Teaching Hospital Peshawar from Oct 9, 2015 to April 9, 2016. All patients meeting the inclusion criteria were included in the study through OPD and ER. An informed written consent was taken. Every patient went through Thessaly test followed MRI of the knee with suspected meniscal injury. The time taken by clinical test was almost 10 minutes. The maximum time gap between index tests and reference test was approximately 120 minutes; consequently, no intervention was done between the procedures. A pre-designed Performa was used to extract the demographic data. For data analysis SPSS-17 was used, frequency and percentage was calculated for categorical variables like Thessaly test and MRI. Mean ± SD were calculated for numerical variables. Specificity,

sensitivity positive predictive value (PPV) and negative predictive value (NPV) were extracted while taking MRI as gold standard.

RESULTS

In this study 223 patients presenting with suspected meniscal knee injuries, in which 160 (71.74%) are males and 63 (40.69%) are females while male:female ratio is 2.52:1. Mean age of the patients are recorded as 31.55±10.83 years. Patients age was distributed in three categories, out of which maximum are with age of less than or equal to 30 years 130 (58.29%) while 82 (36.77%) patients are in the age range of 31-50 years, 11 (4.93%) are of age group above 50 years (Table 1).

The sensitivity and specificity is recorded using 2x2 table vide cross tabulation with percentage of 95.1% and 78.9% respectively. The same calculation was applied for positive predictive value and negative predictive value for which percentage is 95.7% and 76.9% respectively. Using the results of sensitivity and specificity, positive and negative likelihood ratio is calculated for Thessaly study which is 4.31 and 0.06 respectively. Finally the effectiveness of Thessaly test is plotted in ROC curve having area of 0.870 under the curve (Fig. 1). All the calculation clearly shows the effectiveness of Thessaly test before MRI for diagnostic and screening purpose.

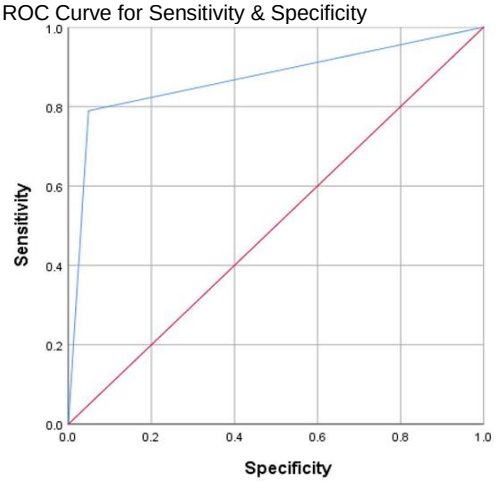
Table 1: Age distribution (n=223)

Age (years)	No.	%
<30	130	58.29
31 - 50	85	36.77
>50	11	4.93

DISCUSSION

Athletes are more prone to meniscal tears were present 15% of all sports injury cases.[1] Meniscal tears shows a unique pattern of bimodal peak regarding the age distribution of patient with acute injuries common in young active patients between 10-30 years of age and injuries cause by chronic degenerative changes are more common in senile age. Such patients presents acutely to the emergency department due to extreme pain at time of occurrence while for regular treatment specialist will touched for follow-ups and required intervention

Fig. 1: ROC Curve for Sensitivity & Specificity



The diagnostic accuracy of Thessaly test has been checked by many previous studies since the original publication by Karachalios et al in 2005.[9] The results of studies varies like a retrospective study of 116 patients conducted by, Harrison et al[10] showed the validation of Thessaly Test in comparison with arthroscopy concluding that the Thessaly Test is an accurate and valid test that can be used for diagnosis of meniscal tears. The sensitivity was found to be 90% and a specificity of 98%.

In a systemic review/meta-analysis conducted by Ockert et al[11] conducted in 2010, it was shown that use of Thessaly test in physical examination can improve the accuracy of examination and also enhances the probability of the correct diagnosis. The results of this study showed that the Thessaly test had sensitivity recorded 91% while specificity of 97%, the PPV was shown to be 97% and NPV recorded was 91%. This revealed the highest testing quality of the Thessaly test in examinations.

Another study conducted by Goossens et al in 2015 to compare the diagnostic accuracy of Thessaly test with arthroscopy examination in patients with suspected meniscal tear. [12] In this study sensitivity of Thessaly test was recorded as 64% while specificity as 53%, positive predictive value and negative predictive value was 87% and 23% and positive and negative likelihood ratios of 1.37 and 0.68, respectively. The combination of two test i.e. positive McMurray and Thessaly tests showed a sensitivity of 53% and specificity of 62%.

Our results showed that majority of the patients having meniscal knee injuries were below 30 years of age. In majority cases the medial meniscus was injured. This test is more accurate in cases of only meniscal injuries. Similarly, the Thessaly test was more accurate in cases of associated ACL injury than associated PCL injury[13, 14].

The study also demonstrated that the Thessaly Test used alone is an accurate and excellent physical test for diagnosing of meniscal tears at all means. The studies show that Thessaly Test is a good diagnostic examination tool that can be used alternatively to MRI for screening of suspected meniscal knee injuries which can be further evaluated. Our results demonstrates that in the hands of well experienced musculoskeletal clinicians, Thessaly test being used for meniscal tears has a great value if used indiscriminately[15-16].

CONCLUSION

The data showed that meniscal injury is more common in male and younger patients. We also conclude the Thessaly test at 20^{o} of knee flexion used in isolation seems useful to accurately determine meniscal tears. It has proved to be sensitive and specific clinical test to diagnose meniscal knee injuries with excellent +LR and –LR with area under ROC curve sufficient enough to show efficiency of Thessaly test. The test is comparable to MRI. Thessaly test can be safely used for screening of patients for suspected meniscal tears instead of MRI which is both costly and is not easily available everywhere.

REFERENCES

1. Shiraev T, Anderson SE, Hope N. Meniscal tear - presentation, diagnosis and management. Aust Fam Physician 2012;41(4):182-7.

2. Morelli V, Braxton TM Jr. Meniscal, plica, patellar, and patellofemoral injuries of the knee: updates, controversies and advancements. Prim Care 2013;40(2):357-82.
3. Englund M, Roemer FW, Hayashi D, Crema MD, Guermazi A. Meniscus pathology, osteoarthritis and the treatment controversy. Nat Rev Rheumatol 2012;8(7):412-9.
4. Englund M, Guermazi A, Gale D, Hunter DJ, Aliabadi P, Clancy M, Felson DT. Incidental meniscal findings on knee MRI in middle-aged and elderly persons. N Engl J Med 2008;359(11):1108-15.
5. Snoeker BA, Bakker EW, Kegel CA, Lucas C. Risk factors for meniscal tears: a systematic review including meta-analysis. J Orthop Sports Phys Ther 2013;43:352-67.
6. Brendan R. Barber EGM. Meniscal injuries and imaging the postoperative meniscus. Radiol Clin N Am 2013;51:371–91.
7. Ekjcvgazvdbpvgmsp PG. Validity of the Thessaly test in evaluating meniscal tears compared with arthroscopy: A diagnostic accuracy study. J Orthop Sports Phys Ther 2015;45(1):75-8.
8. Peixoto J, Tarpo A, "Diagnostic accuracy of the Thessaly test for predicting meniscal tears in patients aged 15 to 50 as measured by sensitivity, specificity, and likelihood ratios" (2012). [Online]. [Cited on Jan 1,2012**]** Available at http://commons.pacificu.edu/ptcats/29
9. 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;87:955–62.
10. Harrison BK, Abell BE, Gibson TW. The Thessaly test for detection of meniscal tears: validation of a new physical examination technique for primary care medicine. Clin J Sport Med 2009;19:9–12.
11. Ockert B, Haasters F, Polzer H, Grote S, Kessler MA, Mutschler W, Kanz KG. Value of the clinical examination in suspected meniscal injuries. A meta-analysis. Unfallchirurg 2010;113(4):293-9.
12. Goossens P, Keijsers E, van Geenen RJ, Zijta A, van den Broek M, Verhagen AP, Scholten-Peeters GG. Validity of the Thessaly test in evaluating meniscal tears compared with arthroscopy: a diagnostic accuracy study. J Orthop Sports Phys Ther 2015;45(1):18-24.
13. Jeong HJ, Lee SH, Ko CS. Meniscectomy.. Knee Surg Relat Res 2012; 24 (3): 129–36.
14. Arif U , Shah Z, Khan M, Ijaz M, Qayum H. Diagnostic Accuracy of 1.5 Tesla MRI in the Diagnosis of Meniscal Tears of Knee Joint. PJMHS 2013; 7 (1): 227-30.
15. Yaqoob J, Alam MS, Khalid N. Diagnostic accuracy of Magnetic Resonance Imaging in assessment of Meniscal and ACL tear: Correlation with arthroscopy. Pak J Med Sci 2015; 31(2):263-8
16. Blyth M, Anthony I, Francq B, Brooksbank K, Downie P, Powell A, et al. Diagnostic accuracy of the Thessaly test, standardised clinical history and other clinical examination tests (Apley's, McMurray's and joint line tenderness) for meniscal tears in comparison with magnetic resonance imaging diagnosis. Health Technol Assess 2015;19(62).1-61