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Original Research Article

A Co-Related Study of Clinical Evaluation, Magnetic Resonance Imaging, and Arthroscopy in Cruciate Ligament and Meniscal Injuries

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Conflict of interest: Nil

Abstract:

Background: Injury to the Knee joint is a very common orthopedic condition resulting in Meniscal tears and tears of anterior cruciate ligaments (ACL) are resulting in unstable movements. Arthroscopy surgeries are commonly performed in such conditions minimizing the tissue trauma. A study was conducted in a tertiary care Hospital to reconstruct the ACL and manage the Meniscus tears. To determine the diagnostic values of clinical examination for Meniscal tears, individually and in combination with MRI scan and Arthroscopy which would further help in improving clinical diagnosis and management of Meniscal injuries and ACL injuries, a study was conducted.

Aim of the study: To Identify, classify and grade the injuries of Menisci and ACL injuries to determine the diagnostic values of clinical examination, MRI scan and Arthroscopy and to correlate their specificity, sensitivity, Accuracy and DOR which would provide appropriate treatment plans either Meniscectomy or repair of ACL in Knee injuries.

Materials: 48 patients with traumatic Meniscal or ACL injuries attending the Department of orthopedics of a Tertiary care Hospital, were included prospectively, examined clinically, investigated with MRI scan. All the patients were subjected to Arthroscopy for final confirmation of the diagnosis, repair of Menisci/ excision and repair of ACL. Individual clinical tests, composite test and MRI scan were compared one against the others to find out the sensitivity, specificity accuracy and DOR.

Results: Among the 48 patients there were 31 males (64.58%) and 17 (35.41%) females with a male to female ratio of 1.82:1. The mean age in males was 34.12±3.10 years and in females it was 36.18±2.15 years. The nature of injuries were varying with sports injuries noted in 19 (39.58) patients, accidental injuries in 12 (25%), Road traffic accidents in 09 (18.75%), assaults in 05 (10.41%) and others in 03 (06.25%). In this study the composite test showed the highest sensitivity, specificity and accuracy (91.66, 87.50% and 89.58% respectively) MRI scan showed the sensitivity, specificity and accuracy of 87.5% in all. The DOR was significant with all the clinical and tests and MRI scans. (p- Value less than 0.05) In patients with ACL injuries Anterior Drawer test showed the highest sensitivity, specificity and accuracy (84.61%, 81.81% and 83.33% respectively) MRI scan showed the sensitivity, specificity and accuracy of 87.5% in all. The DOR was also significant with all the clinical and tests and MRI scans for ACL injuries. (p-value less than 0.05),

Conclusions: The reliability of individual tests such as Apley's test, Joint line tenderness, McMurray's test, and 20 degrees Thessaly test showed limited reliability, but composite test which combined the joint line tenderness, Apley's test and MC Murray's test have shown a greatly improved diagnostic value at par with the MRI scans. In cases of ACL tears, Anterior drawer test was more accurate for predicting, its diagnosis; on the other hand, MRI scan findings showed less accuracy for predicting, their diagnosis.

Keywords: Arthroscopy, Knee joint, Meniscus, Torsion force and anterior cruciate Ligament.

Introduction

Meniscal injuries of the Knee joint often occur due to rotational force occurring in a joint in flexed position. [1] The mechanism of Meniscal injury or ACL injury is usually described as the rotation of

the femur on the tibia with the knee joint in a flexed position. [2] The femur with all the weight of the body of the individual actually causes the rotational force on the medial Meniscus and/or ACL making it to move posteriorly as well as to the center of the joint. [3] If the outer attachment of the Meniscus is strong enough, it may prevent the Meniscus getting torn. But if the attachment is weak, it causes stretch on it and avulses the posterior part towards the center of the joint. Sometimes the avulsed meniscus may get caught between the femur and the tibia. Invariably it is torn longitudinally when the joint is suddenly extended. [4] But when the longitudinal tear extends anteriorly beyond the medial collateral ligament, the torn Meniscus gets caught in the intercondylar notch which prevents it to return to its former position. This type of Meniscal injury is called as classic bucket-handle tear with locked knee joint. [4] On the basis of site, type of tear, mechanism of torsion and etiology, Meniscal injuries are classified. [5, 6] As the diagnosis of a Meniscal tear is difficult, usually it is made based on thorough history taking, (to include complaints, trauma history, mode of injury, findings on clinical examination of the knee joint. Whereas MRI scan helps the surgeon to interpret the site, type of Meniscal injury and location of the remnant ligaments. [7, 8] The role of the cruciate ligaments in the knee joint are to stabilize it and acts as axes around which actually the rotary motion occurs whether they are normal or abnormal. [9] The cruciate ligaments also prevent forward and backward gliding of the Tibia on the Femur and controls and monitors the rotation movements at the Knee joint. [10, 11] The ACL is stretched and taut when the knee is in flexion of 70 degrees to 90 degrees and in full extension; usually ACL is torn in this later position. Diagnosis depends on history and physical findings and imaging modality is MRI. [5, 6] The role of MRI scan in the diagnosis of Meniscal injuries and anterior cruciate ligament injuries of the knee joint is considered as a supportive investigation before Arthroscopy is undertaken by many authors. [7] It is a non-invasive diagnostic method usually accepted by the patient and contributes to the clinical examination by the orthopedic surgeon to boost up the confidence. [8] Before undertaking Arthroscopy, clinical examination of the knee and MRI scans of the knee and their correlation should be done to arrive at a correct diagnosis. [9] The aim of this study was to correlate all the three methods to arrive at the correct nature of the Meniscus or cruciate ligament injury trauma. A close search of the literature showed many studies undertaken on these lines, but repeating such a study in the Tertiary care Hospital was to set a protocol unique to the Hospital. So our study is designed to identify correlation of all three methods for all cases in this study.

Study design: This study was an prospective analytical study.

Study population: All the knee injury patients suspected of Meniscal injuries and ACL injuries attending the Department of Orthopedics were included.

Study period: February 2021 to August 2023.

Material and Methods: 48 patients attending the Department of Orthopedics, of a Tertiary care Hospital with clinical symptoms and signs of Meniscal and anterior cruciate ligament tear. AN institution Ethics committee approval was obtained before commencing the study, and committee approved consent letter and proforma were used for the study.

Inclusion Criteria: Patients aged above 18 years and below 45 years were included. Patients of both the genders were included. Patients reporting to the Hospital between 24 hours and 6 weeks were included.

Exclusion Criteria: Patients aged below 18 years and above 45 years were excluded. Patients with history of either arthroscopy or knee surgeries were excluded. Patients with pre-existing pathology of menisci were excluded. Patients with discoid meniscus were excluded. Patients with multi-ligament injuries were excluded. Patients who refused to participate in the study were excluded. Patients with connective tissue disorders and endocrine dysfunction were excluded. All the patients were elicited of thorough clinical history taking and clinical examination. Knee joint was examined using clinical tests: Joint line tenderness, McMurray's test, Apley's test, and 20 degrees Thessaly test. All the subjects included in the study and in whom Arthroplasty was done were subjected to MRI scan of the knee joint and the radiological signs were grades according to Lotysch et al (10) grading system. Grade 1 was Localized areas of hyper-intense shadows without involvement of joint. Grade 2 was linear area of hyper-intense shadows and without involving the joint. Grade 3 was abnormal hyper-intense extending to either superiorly or inferiorly to one articular surface. When grade 3 MRI Meniscal sign present along arthroscopy findings it was considered as a Meniscal tear. For ACL injuries the grading was Grade I Sprain, if there is strectch on ligament fibers without tear. Grade II, Sprain if the ligament fibers found to be torn partially/or incompletely with bleeding. Grade III Sprain, if the ligament fibers are found torn totally/ ruptured, making the ACL split into two pieces. The main tests of clinical examination used for ACL injuries were Anterior Drawer Test, Lachman Test, Pivot shift

Test and Dial test or Tibial external rotation tests. The MRI findings of ACL tears were Diffuse or focal abnormal signal intensities, mass-like intense-shadow at the site of ACL, abnormal shape, resembling a bow and lack of orientation and Unable to locate the ACL completely (Negative reporting). Arthroscopy procedures were performed by the author alone and the Meniscal injuries were recognized during the anterior cruciate ligament repairs and repaired or treated accordingly. The correlation between the clinical signs, MRI scan grading and Arthroscopy findings was done by calculating the sensitivity, specificity, accuracy and Diagnostic Odd Ratio (DOR) of each clinical test, the composite test and MRI scans results, in reference to the results collected during the arthroscopic procedure. True positive (TP) diagnosis was thought not only when the clinical tests and MRI scans correlate with torn meniscus or ACL but also arthroscopy confirms the final diagnosis. The term True negative (TN) was used when the clinical examination and MRI scans were negative but at arthroscopy Meniscal and/ or ACL tears were noted. False positive (FP) term used when clinical examination or MRI showed features of Meniscal and ACL tear but arthroplasty the said injuries were absent. False negative (FN) term was used if on clinical examination or MRI scans there was no doubt of Meniscus or ACL tears, but at arthroscopy torn Meniscus or ACL were observed. Standard formulae to calculate sensitivity, specificity, accuracy and DOR were used in the study. They were, for Sensitivity: (TP / (TP + FN)) × 100% was used. For Specificity: (TN / (TN + FP)) × 100% formula was used. For Accuracy: ((TP + TN) / (TP + FP + TN + FN)) formula and for Diagnostic Odd Ratio (DOR): TP ∗ TN / FP ∗ FN formula were used.

Statistical analysis: Statistical analysis was done using the SPSS 16.0, software. All the descriptive statistics were used to determine numbers, percentages, mean, median, and standard deviation. Sensitivity, specificity and accuracy were displayed as a percentage ± standard deviation within the 95% confidence interval. Direct comparison of clinical tests was calculated using chi-square test. The results were considered to be statistically significant at p-value less than 0.05 ($p < 0.05$).

Results

Among the 48 patients included in the study, there were 31 males (64.58%) and 17 (35.41%) females with a male to female ratio of 1.82:1. The mean age in males was 34.12±3.10 years and in females it was 36.18±2.15 years. The median age was 29 years in males and 32 in the females. The nature of injuries were varying with sports injuries noted in 19 (39.58) patients, accidental injuries in 12 (25%), Road traffic accidents in 09 (18.75%), assaults in 05 (10.41%) and others in 03 (06.25%). (Table 1) The Gender difference in the incidence of Meniscal and anterior cruciate ligament was found to be significant statistically with p value at 0.001. It was observed that medial Meniscus injury was found in 18 (37.5%) patients, Lateral Meniscus injury in 15 (31.25%) patients, injury to both the Menisci was found in 06 (12.5%) patients and no injury was found in 09 (18.75%) patients. (Table 1) 03 (06.25%) Patients reported within 24 hours, 14 (29.16%) patients reported between 03 and 05 days, 14 (29.16%) patients reported between 01 and 03 weeks and 17 patients reported between 03 and 06 weeks in the study (Table 1).

Table 1:

Observation	Number	Percentage	P value
Males	31	64.58	**0.001**
Females	17	35.41	**0.001**
Mean Age Males Females	 30.12±3.10 36.18±2.15	 --	 --
Nature of Injury Sports Accidental RTA Assault Other	 19 12 09 05 03	 39.58 25 18.75 10.41 06.25	 0.211
Meniscal Injuries Medial Lateral Both ACL PCL None	 18 15 06 31 02 09	 37.5 31.25 22.9 64.58 04.16 08.33	 0.114
ACL Injuries Grade I	 04	 08.33	 **0.001**

Grade II Grade III	19 08	39.58 16.66	
Presenting complaint Instability of the Knee Locking of the Knee Pain in the Knee	 21 19 08	 43.75 39.58 16.66	0.132
Reporting time 24 hours 03 to 05 days 01 to 3 weeks 03 to 06 weeks	 03 14 14 17	 06.25 29.16 29.16 35.41	0.315

Table 1: Showing the demographic data, reporting time and type of injuries (n-48)

The patients suspected to have Medial meniscus injuries were clinically examined and by MRI scan and the Number of true positive, false positive, true negative, false-negative cases, sensitivity, specificity, accuracy and Diagnostic odds ratio were calculated. The specificity, sensitivity, Accuracy and DOR values were shown in the table 2. In this study the composite test showed the highest sensitivity and accuracy (80%, 77.08%) and Thessaly test showed specificity of 76.66% of all the clinical tests for medial meniscus injuries. MRI scan showed the sensitivity of 85.71% and specificity of 77.77% and accuracy of 81.25%.

The DOR was significant with all the clinical and tests and MRI scans. (p- Value less than 0.05), (Table 2)

Table 2:

Medial Meniscal tears								
	TP	**FP**	**TN**	**FN**	**Sensitivity**	**Specificity**	**Accuracy**	**DOR (p)**
Joint line tenderness	19	11	13	5	79.16% (51.4 - 89)	54.16% (37.4–70.3)	66.66% (46.42 -73.58)	4.49 (0.001)
McMurray's test	20	10	12	6	76.92% (60.5–95.4)	54.54% (57.5–89.2)	66.66% (63.25–82.44)	04.0 (0.014)
Apley's test	17	9	11	7	65% (44.1–85.9)	70% (53.6–86.4)	68% (55.07–80.93)	4.3333 (0.0172)
Thessaly test	14	7	23	6	70.83% (47.7–88.7)	76.66% (61.5–91.8)	62.5% (65.74–78.16)	7.66 (0.011)
Composite test	16	7	21	4	80% (64.3 – 96.1)	75% (57.5–89.2)	77.08% (66.52–89.48)	12 (0.0001)
MRI scans	18	6	21	3	85.71% (74.8 – 97.21)	77.77% (70–96.7)	81.25% (76.83–95.62)	21.0 (<0.0001)

Table 2: Showing the sensitivity scores of the clinical, MRI scan and Arthroscopy findings in the medial Meniscus injuries of the study in the study (n-48).

The patients suspected to have Medial meniscus injuries were clinically examined and by MRI scan and the Number of true positive, false positive, true negative, false-negative cases, sensitivity, specificity, accuracy and Diagnostic odds ratio were calculated. The specificity, sensitivity, Accuracy and DOR values were shown in the table 3. In this study the composite test showed the highest sensitivity, specificity and accuracy (91.66, 87.50% and 89.58% respectively) MRI scan showed the sensitivity, specificity and accuracy of 87.5% in all. The DOR was significant with all the clinical and tests and MRI scans. (p value less than 0.05), (Table 3)

Table 3:

Lateral Meniscal tears								
	TP	**FP**	**TN**	**FN**	**Sensitivity**	**Specificity**	**Accuracy**	**DOR (p)**
Joint line tenderness	19	8	14	7	73.07% (55.7–89.3)	75% (43.3–80.2)	54.16% (55.1–80.22)	2.37 (0.023)
McMurray's test	18	6	16	8	69.23% (50.1–82.0)	72.72% (55.40.21)	70.83% (57.15–81.30)	6.0 (0.002)
Apley's test	18	7	15	8	69.23% (51.5–87.0)	68.18% (52.6–89.0)	68.75% (57.3–82.7)	4.82 (0.003)
Thessaly test	19	6	16	7	76% (56.0–90.1)	72.72% (57.7–92.3)	72.91% (61.84–86.16)	7.23 (0.001)
Composite test	22	3	21	2	91.66%	87.50%	89.58%	77.0

					(82.1 – 97.85)	(71.4 – 96.35)	(81.68–98.32)	(<0.0001)
MRI scans	21	3	21	3	87.5% (72.1 - 100)	87.5% (74.3 -100)	87.5% (77.99–95.01)	49.6 (<0.0001)

[a]95% confidence interval.

Table 3: Showing the sensitivity scores of the clinical, MRI scan and Arthroscopy findings in the lateral Meniscus injuries of the study (n-48).

The patients suspected to have cruciate ligament tears (ACL or PCL) were clinically examined and by MRI scan and Arthroscopy and the number of true positive, false positive, true negative, false-negative cases, sensitivity, specificity, accuracy and Diagnostic odds ratio were calculated. The specificity, sensitivity, Accuracy and DOR values were shown in the table 4. In this study the Anterior Drawer test showed the highest sensitivity, specificity and accuracy (84.61%, 81.81% and 83.33% respectively) MRI scan showed the sensitivity, specificity and accuracy of 87.5% in all. The DOR was significant with all the clinical and tests and MRI scans for ACL injuries. (p-value less than 0.05), (Table 4)

Among the Cruciate ligaments observed while performing Arthroscopy, it was found that the sensitivity was 82.5%, specificity was 85.5%, Accuracy was 83.5% with DOR at 19.6. All the findings were significant statistically with p value less than 0.05. (Table 4)

ACL tears

Table 4:

ACL Tears	Number of cases				Sensitivity	Specificity	Accuracy	DOR	P value
	TP	FP	TN	FN					
Pivot shift Test	18	6	16	8	69.23% (59.11–81.0)	72.72% (53.40-82.13)	70.83% (57.15–81.30)	6.0 (0.002)	0.001
Lachman Test	18	7	15	8	69.23% (51.5–87.0)	68.18% (52.6–89.0)	68.75% (57.3–82.7)	4.82 (0.003)	0.002
Anterior Drawer Test	22	4	18	4	84.61% (56.0–90.1)	81.81% (57.7–92.3)	83.33% (61.84-86.16)	7.23 (0.001)	0.012
MRI scans	41	21	3	21	3	87.5% (72.1 - 100)	87.5% (74.3 -100)	87.5% (77.99–95.01)	49.6 (<0.0001)
Arthroscopy findings	42	22	3	21	04	82.5% (72.1 - 100)	85.5% (74.3 -100)	83.5% (77.99–95.01)	19.6 (<0.081)

Table 4: Showing the sensitivity scores of the clinical, MRI scan and Arthroscopy findings in the ACL injuries of the study (n-48).

Discussion

The aims and objectives of this study was to Identify, classify and grade the injuries of Menisci and ACL to correlate the importance of clinical examination, MRI scans and Arthroscopy findings to analyze the sensitivity, specificity, accuracy and DOR. These would help in providing appropriate surgical treatment like Meniscectomy or its repair and repair of ACL injuries. It was observed many authors' in recent years that Mc Murray's test though widely used in clinical practice has shown difference in diagnostic results. [13] Wayne H et al. in 2009 conducted a meta-analysis wherein they observed that the McMurray's test had a sensitivity varying from 29 to 88% and the specificity from 50 to 98% [14]. In this study Mc Murray's test showed a sensitivity of 76.92%, specificity of 54.54% and an accuracy of 66.66% (Table 2 and 3), for medial Meniscal injuries and 69.23%, 72.72% and 70.83% respectively for lateral Meniscal injuries. The lateral Meniscus values were better than the values for Medial Meniscus. However the values were lower than the similar values observed for the composite tests. Similar results were also reported by the study by "Pjotr Goossens" et al. [15] However, study by another author in 2005 by Theofilos Karachalios [16] confirmed that the McMurray's test was more reliable due to its high accuracy especially for the lateral Meniscus injuries. Thessaly test in this study showed a sensitivity of 70.83%, specificity of 76.66% and Accuracy of 62.5% with a DOR of 7.66 and p-value 0.011 for the Medial Meniscus injuries. Thessaly test in this study showed a sensitivity of 76%, specificity of 72.72% and Accuracy of 72.91% with a DOR of 7.23 and p value 0.011 for the lateral Meniscus injuries. Thessaly test consists of elicitation of tenderness and its severity expressed as a subjective response by the patients. The values of sensitivity, specificity and Accuracy by Pjotr Goossens [15] from their 589 patient's knees showed an observation of 64%; 53%; 62% respectively, in contrast. The large degree of such variation could be explained by the nature of the

subjective test wherein the patient's subjective response was given importance when they have to actively do different movements while lifting weights with then foot. The extension lag possible in this test might also play a role in the diagnostic value of Thessaly test. The values of Sensitivity, Specificity and accuracy were negligible, between the medial and lateral meniscus in this study. (Table 2 and 3) But the values showed marked difference when compared between Thessaly test and combined test, in terms of diagnosis of Lateral Meniscus injuries in the study. The simplest test employed in the diagnosis of Meniscal injuries in the study was joint line tenderness elicitation test, and its sensitivity, specificity and the accuracy were 79.16%, 54.16% and 66.66% respectively for the medial Meniscus and 73.07%, 75% and 54.16% of the lateral Meniscus (Table 2 and 3) respectively. In a similar study by Eren OT [18], the values were for the medial meniscus was 73%, 66.7% and 70% respectively. The values for the lateral Meniscus were 74%, 51.28% and 62.10% respectively. The DOR for the joint line tenderness was insignificant according to Eren OT [18], (p-value at 0.1078), but this study showed a significant value of DOR for Medial meniscus with p-value at 0.014 and 0.023 for the lateral Mensicus. (Table 2 and 3) The difference in the values and difference of opinion between these two studies could be explained by the tenderness which was indistinguishable pain/ tenderness from the other parts of the knee like ligaments of the capsule, pain from other soft tissues.

Many authors felt that in patients who have associated ACL injuries could not localize the elicitation of tenderness by the surgeon. In this study Apley's test was used to diagnose clinically the Meniscal injuries and ACL injuries. It was observed that the sensitivity, specificity and accuracy scores were 65%, 70% and 68% in Medial Meniscus injuries and 69.23%, 68.18% and 68.75% in lateral Meniscus injuries respectively. These scores were comparable with other studies like Eric J. Hegedus et al [19] who found the scores were 60.7%; 70.2% and 69%. In addition in this study the difference in the Accuracy scores was minimal between medial and lateral Meniscus injuries. (Table 2 and 3) This study showed highest values for the composite test with sensitivity, specificity and accuracy (91.66%, 87.50% and 89.58% respectively), MRI scans showed the sensitivity, specificity and accuracy of 87.5% in all patients. The DOR was also significant with all the clinical and tests and MRI scans. (p value less than 0.05), (Table 3) The combined test was formulated by P. Antinolfi et al. [20] in 2017, by assimilating the three tests; Joint line tenderness, McMurray's test and Apley's tests. The sensitivity, specificity and accuracy scores, reported by him were in the order of 91%, 87%, 90% respectively for the medial meniscus, and 86%, 90%, 87% for the lateral meniscus injuries; these results were better than MRI scan scores. Rose NE, Gold SM [21] conducted a large study and felt that when clinical diagnosis is confirming Meniscal tear, undertaking MRI scan before arthroscopic examination is not necessary. But the present study suggests otherwise. The present study compared the sensitivity of MRI scan against the Sensitivity of clinical examinations particularly composite test and found that both were complimentary to each other; the sensitivity of composite test being 80%, specificity being 70% and accuracy being 77.08% for medial Meniscus injuries and 91.66%, 87.50% and 89.58% for the lateral Meniscus and the values for MRI scan were 85.71%, 77.77% and 81.25% respectively. It showed that the inconsistent individual clinical tests were complimented by the MRI scans with their values. Different researchers have proven through their studies that MRI scans were highly reliable in the diagnosis of the Knee injuries with Meniscal or ACL tears. [21, 22] MRI scans also help to locate, classify and grade the Meniscal injuries to plan the protocol for surgery beforehand. [9, 10]

The present study emphasizes upon clinical examination in diagnosing knee injuries and should not be neglected and total reliance on MRI scans to be avoided. The present study showed that sometimes individual tests may not be useful in confirming the diagnosis by clinical examination only, but using the composite test. The Cruciate ligaments studied and observed while performing Arthroscopy, it was found that the sensitivity was 82.5%, specificity was 85.5%, and Accuracy was 83.5% with DOR at 19.6 for all the ACL ligament tears. All the findings were significant statistically with p value less than 0.05 in this study. (Table 4) Rubin et al [24] reported 93% sensitivity for diagnosing isolated ACL tears. In the literature many studies showed the specificity of 93-100% and sensitivity of 92-100% for the MRI scans in the diagnosis of ACL tears. MRI scans are good for the posterior cruciate ligament tears. References showed the accuracy rate for PCL ruptures higher than 90% [25]. In this study only 02 PCL rupture were observed and both were identified by MRI scan a well as Arthroscopy (100% specificity).

Limitations of the Study:

The subjects in the study were of small number and hence statistical significance cannot be considered for conclusive statement. But the results were comparable with many references. However, surgeons must remember that ACL or PCL tears are problematic for to investigate and confirm as they are in inaccessible anatomical positions anatomically in the knee joint and many times tend to give false negative results [26]

Conclusions

The reliability of individual tests such as Apley's test, Joint line tenderness, McMurray's test, and 20 degrees Thessaly test showed limited reliability, but composite test which combined the joint line tenderness, Apley's test and MC Murray's test have shown a greatly improved diagnostic value at par with the MRI scans. A thorough clinical examination sometimes outsmarts the MRI scans but MRI scans should be used as a standard diagnostic tool and as documentary evidence. In cases of ACL tears, Anterior Drawer test was more accurate for predicting, its diagnosis; on the other hand, MRI scan findings showed less accuracy for predicting, their diagnosis. According to many studies of clinical examination tests compared (correlated) with arthroscopy, the accuracy of predicting ACL tears depends on the level of the skilled orthopedic or trauma surgeon's hands. MRI scans also would help the surgeon to plan the surgery beforehand. MRI scan would also help the surgeon to avoid the risk of misdiagnosis and negative Arthroscopy procedure.

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