DIAGNOSTIC ACCURACY OF CLINICAL TESTS IN KNEE JOINT INJURIES: A SINGLE CENTERED EXPERIENCE

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ABSTRACT:

OBJECTIVES:

The accuracy of clinical tests (Lachman, McMurray, Anterior Drawer) in the diagnosis of knee joint injuries in comparison to arthroscopy taken as gold standard.

METHODOLOGY:

This cross-sectional study was conducted at the Department of Orthopedic Surgery, Khyber Teaching Hospital, Peshawar for 3 years. Total of 48 patients were recruited in the study. Data was collected after ethical approval from the hospital ethical committee using consecutive non-probability sampling techniques. Written informed consent was obtained from the patients. Arthroscopy examination was taken as a gold standard. Data analysis was performed using statistical software SPSS 21 and MEDCALC online software for calculating sensitivity and specificities of the clinical tests.

RESULTS:

Mean age was 26.4+6.5 years. Lachman and Anterior Drawer tests were noted to have 91.67% and 66.67% sensitivity for anterior cruciate ligament while McMurray test was noted only 66.67% sensitive for both meniscal injuries. On the other hand, Lachman was 95.8% specific, McMurray was 77.78%, and Anterior Drawer was 79.2% specific. Regarding accuracy, Lachman was 93.7%, McMurray 70.8% and Anterior Drawer was 72.9% accurate.

CONCLUSION:

Among clinical examination and specific examination tests, Lachman has high sensitivity, specificity and accuracy followed by Anterior Drawer test and MacMurray for diagnosing anterior cruciate ligament and meniscal injuries of knee joint.

KEYWORDS: *Lachman, McMurray, Anterior Drawer, Arthroscopy*

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INTRODUCTION:

Knee joint is a complex joint consisting of anterior and posterior cruciate ligaments and medial and lateral menisci. It is one of the most commonly involved joints in injuries, which may be isolated injury to the joint or is a part of multiple trauma[1]. Knee joint is one of the commonly prone joints to injuries in the body. Damage to the supporting structures (ligaments, menisci and cartilage) of this joint can lead to permanent disabilities. These make the timely and accurate diagnosis of knee joint

injuries of utmost importance. Beside medical history, clinical examination plays an important role in diagnosis of these injuries[2,3]. Conventionally, knee injuries are assessed clinically and by radiography[4]. In modern orthopedics MRI followed by arthroscopic examination if necessary, is the modality of choice to assess knee injuries[5]. A good history and clinical evaluation helps immensely in diagnosing knee injuries. Different clinical tests and examination methods that were developed before the availability of modern Imaging techniques are still equally or more accurate than newer imaging methods[6]. Studies suggested that detailed clinical examination along with special clinical tests are quite helpful in diagnosing knee pathology with sensitivity ranging from 35-70%[1]. A study by Solivietti et al, shows that approximately 20% patients have not undergone proper physical examination prior to proceeding for MRI[7]. The importance of MRI and clinical examination is its non-invasiveness. On other hand arthroscopy is the gold standard procedure having both diagnostic as well as therapeutic role. According to currently available data its sensitivity and specific procedure for assessing knee injury and its accuracy reaches up to 100%. But as it's invasive so it's not without complications like infection, hemarthrosis, future adhesions and sympathetic dystrophy especially in long term[8,9]. Current study analyzes the accuracy of clinical tests in the diagnosis of knee joint injuries in comparison to arthroscopy taken as the gold standard.

METHODOLOGY:

This cross-sectional study was conducted at the Department of Orthopedic Surgery, Khyber Teaching Hospital, Peshawar from January 2017 to December 2019. Total of 48 patients were recruited in the study. All patients of knee trauma of either gender who had suspected anterior cruciate ligament and/or meniscal injuries upon clinical examination and whose age was from 18 years to 60 years, who were admitted to the hospital for arthroscopic examination were included in the study. Patients with associated fracture patients with dislocation of knee joint on plain radiograph, patients who had any contraindications arthroscopy upon and patients having injuries other than meniscal or ACL, PCL and patients with osteoarthritic knee on clinical examination

and plain radiographs were excluded from the study. Data was collected after ethical approval from the hospital ethical committee using consecutive non-probability sampling techniques. Written informed consent was obtained from the patients. Based on history initial clinical examination, patients suspected of having intra-articular injuries like meniscal tears and anterior cruciate ligament tear were booked for arthroscopy. Arthroscopy examination was taken as gold standard and performed by a single CPSP fellow consultant orthopedic surgeon having specialized training in knee arthroscopies. Detailed examination of the knee was performed and structures were identified. Further surgical intervention was carried out according to the pathological structure involved. Anterior Drawer test and Lachman test was performed for ACL injury while McMurray test was performed for both medial and lateral menisci. These clinical tests were performed by orthopedic surgeons who had at least 5 years post fellowship experience in Orthopedic surgery. Data analysis was performed using statistical software SPSS 21. For continuous variables like age, mean and standard deviation was calculated while frequency and percentages were calculated for gender and from area they belonged. Initially false positive, false negative, true positive and true negative were found via crosstabs using SPSS, these values were entered to MEDCALC online software for calculating sensitivity and specificities of the clinical tests.

RESULTS:

Mean age at presentation was 26.4+6.5 years. 21 (87.5%) patients were males while 3 (12.5%) were females, 14 (41.7%) were from rural areas while 10 (58.4%) from urban. Patients were examined for knee injuries. Lachman and Anterior Drawer tests were noted to have 91.67% and 66.67% sensitivity for anterior cruciate ligament while McMurray test was noted only 66.67% sensitive for both meniscal injuries details given in Table 1.

Table 1: Diagnostic Accuracy of Clinical Tests in Knee Joint Injuries

Tests	Sensitivity (%)	Specificity (%)	Accuracy (%)
Lachman	91.6% (73%-99%)	95.8% (78.8%-99.9%)	93.7% (82.8%-98.7%)
McMurray	66.6% (47.2%-82.7%)	77.7% (52.3%-93.6%)	70.8% (56%-83%)
Anterior Drawer	66.6% (44.7%-84.4%)	79.2% (57.8%-92.9%)	72.9% (58.15%-84.7%)

95% Confidence Interval

DISCUSSION:

Anterior cruciate ligament and meniscal injuries are the commonly occurring injuries involving knee joints. Most of these injuries happen during sport activities, though non-sport activities can also lead to ACL and meniscal injuries. Menisci, the two fibrocartilaginous structures, deepening the condylar areas, which serve an important function in stability of the joint and enable it for weight bearing. It uniformly distributes the synovial fluid and acts as a shock absorber. ACL prevents the forward translation of tibia on the femur and also stabilizes against rotational loads[10]. ACL injuries mostly happen in non-contact injuries by forces generated within the athlete's body[11]. The knee joint injuries are diagnosed clinically, augmented by radiological investigations and in recent times by arthroscopy. Every practitioner relies on a number of clinical tests that helps him accurately make a diagnosis prior to doing an MRI. Therefore, it is important to know the sensitivity and specificity of the clinical tests performed for diagnosis of knee injuries[12]. Our study analyses the diagnostic accuracy of Lachman, McMurray and Anterior Drawer tests in knee injuries. We recorded 66.67% sensitivity and specificity of 79.2% with an accuracy of 72.95% for anterior drawer test while Lachman was 91.67% sensitive and 95.8% specific with an accuracy of 93.7%. The sensitivity for McMurray was calculated to be 66.67%, a specificity of 77.78% with 70.8% accuracy. A researcher performed a similar study comparing the diagnostic accuracy of anterior drawer test and Lachman test for the injuries involving anterior cruciate ligament without anesthesia and with anesthesia. He calculates the sensitivity of anterior draw test as 94.4% and 96.4% without anesthesia and under anesthesia respectively. While sensitivity for Lachman test with and without anesthesia was 93.5% and 96.9%

respectively[13]. A study compared results of Anterior Drawer test, Lachman test and Pivot Shift test for anterior cruciate ligament injuries in patients with anesthesia and without anesthesia. Their study shows that the Lachman test was 81% sensitive and 87% specific for detecting ACL injuries without anesthesia while under anesthesia Lachman test sensitivity was increased to 91% and while its specificity decreased to 78%. The Anterior Drawer test sensitivity and specificity was only 38% and 81% respectively without anesthesia while under anesthesia sensitivity and specificity was improved to 63% and 91% respectively[14]. Dhavalakumar K Jain evaluated the sensitivity and specificity for anterior draw, Lachman and Pivot Shift tests showing sensitivity and specificity of 89.3% and 100%, and 78.6% and 100% for Anterior Drawer test and Lachman test respectively without anesthesia. Sensitivity and specificity for both these tests was 92.9% and 100% each under anesthesia[15]. Rinonapoli et al, compared the sensitivity and specificity of two clinical tests namely Apleys and McMurray for meniscal injuries. His findings for McMurray test sensitivity are 79.7%, specificity 78.5% and accuracy 79.4% while Apleys was 83.7% sensitive, 71.4% specific with an accuracy of 80.3%[16]. A study by Gupta et al, shows a sensitivity and specificity as 54% and 79% with an accuracy of 67.74%[17]. Our results build on the existing evidence of the importance of clinical examinations and its diagnostic value in knee injuries. Many times, other diagnostic modalities aren't easily accessible, so reliability on clinical examination becomes of great significance. While the sensitivity and specificity of the tests may vary to some extent among different studies cited above, one should keep in mind the differences in study population, which might have contributed to the variations. Our target population was one with no other

pathologies except ACL, PCL and meniscal injuries which may lead to lesser diagnostic accuracy as stated by Kurosaka et al[18].

CONCLUSION:

Among clinical examination and specific examination tests Lachman has high sensitivity, specificity and accuracy followed by Anterior Drawer test and McMurray for diagnosing anterior cruciate ligament and meniscal injuries of knee joint.

LIMITATIONS:

It is also worthwhile to mention that our methodological choices were constrained by our limited study sample size, and only those with ACL, PCL and meniscal injuries excluding patients with other pathologies from the study. While this may have led to variations in results, this in fact does not take from the fact that clinical examination plays a vital role in diagnosing knee injuries.

CONFLICT OF INTEREST: None

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