Original Article

Comparison Of Anterior Drawer, Lachman And Pivot Shift In Case Of Anterior Cruciate Ligament Injury

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Abstract

Introduction: The Anterior Cruciate Ligament (ACL) is a very commonly injured ligament of knee. Several physical examination tests are performed for evaluating ACL stability. The Lachman, pivot-shift and anterior drawer tests are commonly performed for evaluating the knee laxity.

Aim: To compare Anterior drawer test, Lachman test and Pivot shift test in case of ACL tear.

Materials and Methods: This prospective cohort study was conducted at Government Medical College, Kathua, Jammu, India, from August 2021-july 2022. Total 50 patients were included (age group 18-60 years) with symptomatic ACL tear. Three test included Anterior drawer test, Lachman test and Pivot shift were performed and findings were recorded. Sensitivity and specificity were calculated. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0. The p-value ≤0.05 was considered statistically significant.

Results

Total 50 patients were evaluated and analysed including 60% males (n=30) and 40% females (n=20). The mean age of the patients was 34.5±2.6 years. Sensitivity, specificity of anterior drawer test were 83%, 87%, respectively; for Lachman test were 88%, 87% respectively; and for pivot shift were 40%,96% respectively.

Conclusion: The pivot shift showed high specificity, but low sensitivity in the detection of ACL tears in comparison to anterior drawer test and Lachman test.

Keywords: Anterior cruciate ligament, Anterior drawer, Lachman, Pivot shift.

INTRODUCTION

The knee is one of the most frequently injured joint. The cruciate ligaments act as stabilisers of the joint and axis around which rotatory motion, both normal as well as abnormal movements take place [1]. The ACL is a very commonly injured ligament. The leading causes include sports injuries and vehicular trauma. Nearly 200,000 ACL injury annually were reported in US and 75000-100,000 ACL reconstruction are performed each year [2,3].

In the case of an ACL injury, knee laxity is usually evaluated by physical examination using the Lachman [4], pivot-shift [5,6], and anterior drawer tests [7]. Galway RD et al., described the pivot shift test in 1972 and Torg JS et al., described the Lachman test in 1976 [8,4]. In 2014 a new test 'Lever sign test' was introduced by Lelli A with 1.00 sensitivity [9]. Previous studies have reported different sensitivity and specificity for these tests for partial and complete tear, chronic and acute injuries and interobserver variability. It has been reported consistently in many previous studies that the Lachman test had the highest sensitivity (85% to 96%) and the pivot shift test consistently had the highest specificity (97% to 99%) [10,11,12]. An ideal test would have both a high sensitivity and specificity and be easily reproducible. It can be used in both chronic and acute cases, can diagnose both partial and complete tear and with no interobserver variability.

A reproducible, split test, which can be easily performed by the practitioners in the emergency room, office, or training room [12]. There is a scarcity of studies conducted in India that compared these tests in resource limited settings, thus bringing on the novelty of the study. These tests hold the importance as they can be done without any additional cost and can provide a prediction about the ACL tears. Thus, this study was conducted with an aim to compare pivot shift with anterior drawer test and Lachman test in case of ACL tears.

MATERIALS AND METHODS

The prospective cohort study was conducted at Government Medical College, Kathua, Jammu, India, from August 2021-july 2022. Ethical clearance was taken from Government Medical College, kathua, Institutional Ethical Committee. An informed consent was taken from patients before enrolling in the study.

Inclusion criteria: The study population included patients in age group 18-60 years with isolated complete ACL tear, with meniscal injury, chondral injuries, and medial/lateral collateral ligament sprains.

Exclusion criteria: Any patients with associated Posterior Cruciate Ligament (PCL) injury, ACL reinjury, periarticular fracture, and ipsilateral lower limb fractures were excluded from the study.

Tests Employed

Anterior drawer test: The anterior drawer test was done when patient was told to lie in the supine position. Flexion of the hip was done to 45° and that of knee to 90°. For stabilising the leg, the examiner sat on the feet of patient. The forward force was given to the tibia after the hamstring muscles were relaxed. The positive anterior drawer test was suggested in the presence of forward movement of >6–8 mm compared to the normal knee [7].

Lachman test: The Lachman test was done by flexing the knee to 20°. Afterwards, the distal thigh was grabbed by the examiner by one hand, and the proximal leg was grabbed by the other hand. Afterwards, anterior force was applied on leg. The positive Lachman test was indicated by abnormal forward movement and thus ACL injury [4].

Pivot shift test of McIntosh (Miller 2013): With the knee extended, the foot is lifted and the leg is internally rotated, and a valgus stress is applied to the lateral side of the leg in the region of the fibular neck with the opposite hand. The knee is flexed slowly while valgus and internal rotation are maintained. With the knee extended and internally rotated, the tibia is subluxed anteriorly. As the knee is flexed past approximately 30 degrees, the iliotibial band passes posteriorly to the centre of rotation of the knee and provides the force that reduces the lateral tibial plateau on the lateral femoral condyle.

STATISTICAL ANALYSIS

The data was entered in Microsoft (MS) Excel spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0, International Business Machines (IBM) manufacturer, Chicago, United States of America (USA). Categorical variables were presented in number and percentage (%). Positivity and negativity of the tests were used to calculate sensitivity, specificity for predicting the ACL tears by using chi-square test. The p-value <0.05 is considered significant.

RESULTS

Out of total 50 patients, 54% were in the age group 26-40 years, 28% in age 40 years. The mean age of the patients was 34.5±2.6 years. There were 60% males (n=30) and 40% females (n=20)

Sports injury was the most common injury in 24 (48%) patients, followed by fall 13 (26%), road traffic accident 9 (18%), and direct blow in 4 (8%) patients. In 29 (58%) patients, right-side was affected. In majority of the patients 17 (34%) since injury was 6-9 months in 10 (20%), and 3-6 months in 9 (18%) patients. Medial meniscus injury was present in 21 (42%) patients, isolated ACL in 9 (18%), and lateral meniscus in 16 (32%) patients.

Sensitivity, Specificity of anterior drawer test were 83%, 87% respectively. Sensitivity, Specificity of Lachman test were 88%, 87% respectively. Sensitivity, Specificity of pivot shift test were 40% and 96%.

DISCUSSION

In this study, comparison of anterior drawer test, Lachman test and pivot shift in case of ACL tear was done. The findings showed that pivot shift test is highly specific for predicting ACL injury. The present study findings are partially in line with the studies by Deveci A et al., and Thapa et al., who reported that as compared to the anterior drawer, Lachman, the pivot-shift test was more specific in diagnosing both acute and chronic ACL tears, as well as complete and partial ACL tears [15,24]. Previously, Gürpınar T et al., Deveci A et al., Logan MC et al., Kim SJ and Kim HK, reported that the Lachman test was most accurate and reliable for diagnosis of an ACL rupture; and the pivot-shift test was reported to be the least sensitive of the three [13,15,16,17]. According to a meta-analysis including 16 studies, overall sensitivity and specificity of anterior drawer test were 0.725 and 0.927, respectively and that of the Lachman test were 0.871 and 0.97, respectively [19]. Massey PA et al., showed sensitivity and specificity of anterior drawer test to be 82% and 80%, respectively; sensitivity and specificity of Lachman test were 89 and 85, respectively [20]. These findings are similar to results of the present study for the Lachman test and anterior drawer test. It is difficult to diagnose acute ACL injuries because of the associated pain, hemarthrosis, reactive synovitis, and swelling [21]. For acute injuries, the sensitivity of Lachman test and the anterior drawer test as reported in literature was 0.78 and 0.22, respectively [22]. The sensitivity and specificity of these physical examination tests is influenced by several factors. Patients may be guarding because of pain as well as fear of subluxation. The physical exam may be obstructed by the concomitant injuries, like bucket handle meniscus tears leading to locking of the knee. Moreover, it is difficult to diagnose partial ruptures as compared to complete ruptures because of the stability provided by the remaining fibers [23].

CONCLUSION

The Lachman test have maximum sensitivity among the three test with pivot shift having the lowest. Among three pivot shift have the best specificity. The best result is obtained by doing combination of these tests.

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