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Original Article

Comparative study of anatomical anterior cruciate ligament reconstruction versus conventional anterior cruciate ligament reconstruction

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ABSTRACT

Background: Aim of our study was whether anatomical placement of femoral tunnel using central Gillquist portal for visualization improves the rotational and antero-posterior translational stability as compared to conventional two portal technique of placement of femoral tunnel, where anterolateral portal is the visualization portal and anteromedial portal is the working portal. We define this latter method as non-anatomical placement, because we cannot visualize the face of medial surface of lateral femoral condyle and use jig to make the femoral tunnels.

Materials and methods: This study was a retrospective and prospective study conducted in the Department of Orthopaedic Surgery, NSCB Subharti Medical College, Meerut, over a period of 4 years in patients undergoing arthroscopic ACL reconstruction. The follow-up examination included knee joint range of movement assessment, Lachman test, Pivot shift test, IKDC score and Lysholm score at 6 weeks, 3 months, 6 months and 1 year.

Results and conclusions: On final assessment, we concluded that anatomical method of ACL reconstruction gives superior results for antero-posterior stability and although there is not much difference in functional scores when assessed using IKDC scores, but a small statistically significant difference is seen when assessed by using Lysholm scores for functional scoring.

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1. Introduction

A torn anterior cruciate ligament (ACL) is a common injury of knee joint, and its reconstruction is a challenging one. It is

mostly related to sports activities. The activities of modern life, be it domestic or professional, predispose the individual to ACL injury.

The primary function of the ACL is to prevent anterior translation of the tibia. It acts as a secondary stabilizer

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against internal rotation of the tibia and valgus angulation at the knee. Loss of the ACL leads to a decreased magnitude of this coupled rotation during flexion and an unstable knee.

The main mechanism of injury to the ACL being torn is usually non-contact involvement. The most frequent way that the ACL is torn is that the athlete has a planted foot with the knee in an almost extended position (sometimes hyper-extended)¹ and the tibia is generally rotated toward the inside or mid-line of the body, while the knee is flexed greater than 90°.

Review of literature for ACL surgery suggests that it took a long time for some diagnostic and management techniques to establish themselves. Since the early 20th century, there has been increasing awareness of, and interest in, the ligament and its lesions.²

In conventional method of ACL reconstruction, we do not try to identify the original insertion points on the lateral femoral condyle but in anatomical reconstructions an attempt is made to place the graft lower down in center of the femoral insertion of ACL on the medial side of lateral femoral condyle below the resident's ridge on either side of the lateral bifurcate ridge. It is difficult to visualize the face of the medial surface of lateral femoral condyle using a scope in antero-lateral portal because of the overhang of the anterior surface of condyle but it is possible to visualize it better with a central portal through the ligament patellae or through the conventional antero-medial portal.

We were able to directly visualize and identify the resident's ridge as well as the footprints of the femoral attachment of the ACL more clearly using the central Gillquist portal.³ This method of reconstruction has been considered as the anatomical method of ACL reconstruction in our study.

ACL reconstruction with conventional two-portal technique was defined as the non-anatomical method of reconstruction of ACL, which we have used jig to make the femoral tunnel.

Aim of our study was to determine, whether anatomical placement of the femoral tunnel using central Gillquist³ portal for visualization improves the rotational and antero-posterior translational stability as compared to the conventional two portal non-anatomical ACL reconstruction technique of placement of the femoral tunnel.

2. Materials and methods

This study was a retrospective and prospective study conducted in the Department of Orthopaedic Surgery, NSCB Subharti Medical College, Meerut, over a period of 4 years in patients undergoing arthroscopic ACL reconstruction. A total of 60 patients were included in the final study. All the patients included in the study were operated by the same surgeons. 30 patients were operated by the anatomical method of ACL reconstruction using a third Gillquist³ portal to visualize the femoral attachment of ACL between August 2013 and August 2015, comprised our prospective study group. The data of thirty patients, who had undergone ACL reconstruction by conventional two portal technique from August 2011 to August 2013 was collected from hospital records and were followed up. This comprised our retrospective study group.

In both anatomical and non-anatomical groups patients were young active individuals between 18 and 45 years of age from the western region of Uttar Pradesh, India. Majority of the patients were male individuals. In anatomical group there were 27 males and 3 females and in non-anatomical group there were 28 males and 2 female patients.

Standard arthroscopic portals antero-lateral and antero-medial were created. In the anatomical group of patients, besides these two portals an additional central Gillquist³ portal was made through the center of patellar tendon 1 cm below the apex of patella. A single femoral tunnel was created from the antero-medial portal while the scope was placed in the central portal. The tunnel was placed in the center of the ACL footprints under direct vision. Tibial tunnel was made in the standard fashion in both groups using standard tibial jig.

A mean follow-up of 1 year was taken. Lysholm and IKDC scoring was done in all patients preoperatively and at the end of follow-up to evaluate the functional outcome and they were compared in the two groups and put to statistical analysis to reach our conclusions. Further clinical evaluation was done using Lachman and Pivot shift test to test the antero-posterior and the rotational stability, and the two groups were compared based on their results. We indigenously designed a device called Laxometer based on principles of the Rolimeter to objectively assess the anterior translation of tibia on Lachman and Anterior Drawer test, but Pivot shift test remained a subjective test. In order to eliminate inter-observer bias, the findings were verified by two independent consultants (Photograph 1).

The follow-up examination was done at 6 weeks, 3 months, 6 months and 1 year.

Rehabilitation protocol was same for both the groups. Statistical analysis was done using chi square test for quantification of Lachman and Pivot shift test, as it is a frequency table and t test was used to quantify Lysholm and IKDC scores. In all tests value below 0.05 was considered significant.

3. Results

On final assessment, we concluded that anatomical method of ACL reconstruction gives superior results for antero-posterior



Photograph 1 – Showing Lachman test with the Laxometer.

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