



EVALUATION OF ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING BONE-PATELLAR TENDON-BONE GRAFT

Orthopaedics

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ABSTRACT

AIM- Anterior cruciate ligament (ACL) is most common injured ligament in the knee joint. Surgical management of ACL rupture is technically demanding as improper reconstruction can lead to an unstable joint. The aim of present study was to find out the outcome of Arthroscopic reconstruction of ACL using Bone patellar tendon bone (BPTB) graft.

METHOD – It is a retrospective observational study where arthroscopic reconstruction of ACL was done over a period of 5 years. IKDC score was applied to find out the outcome of surgery. Strict post operative rehabilitation regime was followed.

RESULT- After evaluation of 25 cases, 60% (15cases) showed very good outcome, 36%(9 cases) showed good outcome and 4% (1 case) showed poor outcome. Implant related local irritation is seen in 2 patients and low grade infection was seen in 1 patient.

CONCLUSION – Majority of the patients were satisfied with the result so it is purposeful to perform ACL reconstruction arthroscopically using BPTB graft.

KEYWORDS

ACL Reconstruction, BPTB Graft, IKDC Score

INTRODUCTION-

The Anterior Cruciate Ligament is an essential structure that controls the fluid, complex flexion and rotation motion of normal knee. Anterior cruciate ligament is a dynamic structure with unique anatomical and physical properties.^[1] There is little doubt that anterior cruciate ligament is the most frequently torn ligament within the knee. Once the diagnosis of tear of anterior cruciate ligament has been established two treatment alternatives are available. Either the surgeon can manage it conservatively or can treat it surgically. Surgical intervention is advisable in majority of cases of anterior cruciate ligament disruption in a patient having active lifestyle.^[2] In our study we have tried to evaluate the functional outcome of arthroscopic reconstruction of anterior cruciate ligament using bone-patellar tendon-bone autograft.

MATERIALANDMETHOD-

It is a retrospective study of arthroscopic reconstruction of anterior cruciate ligament operated at tertiary care Hospital in central India. A fixed post-operative rehabilitation regime was followed. The patients were operated between the years 2002 to 2007. 34 Cases were included in the study. 9 Cases were lost during the follow up. Remaining 25 cases were followed regularly.

The patients were questioned according to subjective IKDC (International Knee Documentation Committee) form. The answers to the questions allowed evaluating the symptoms, sport activity and function. The IKDC Subjective Knee Evaluation Form is scored by summing the scores for the individual items and then transforming the score to a scale that ranges from 0 to 100.

Surgical Technique Used Was As Follows-

Set up and graft harvesting

Patient position – supine with lateral post

Skin incision of size approx. 7cm and BPTB graft harvested by standard technique.

SIZE - Central third BPTB graft 10 mm wide with 10-11 mm width*25 mm tibial bone block and 10mm*20mm patella bone block.

Graft preparation done in standard manner with use of Ethibond and checked that it passes snugly but easily through 10 mm cylindrical sizer.

ARTHROSCOPIC RECONSTRUCTION-

We use high anterolateral and low anteromedial portal for arthroscopy. Articular and meniscal injury are addressed at first.

Using standard technique tibial and femoral tunnel guide wire placed at foot print of native ACL then reaming done using 10 mm drill over guide pins.

With use of suture passer BPTB graft is placed through tibial tunnel, intercondylar notch and femoral tunnel. Bone tendon junction is placed at internal aperture of femoral tunnel which is marked with coloured suture or marker pen. Fixation of BPTB graft in proper position and tension done using interference screws in standard manner. Tension checked using probe and then lavage and closer done in layers.

AFTER-TREATMENT

The knee was placed in a controlled motion brace locked in 20-90 deg flexion. Patient was put on Rehabilitation exercise program under the supervision of trained physiotherapists and reviewed every 6 wks to check the progress.

RESULTS-

We retrospectively reviewed 25 cases of arthroscopic anterior cruciate ligament reconstruction using autologous bone patellar tendon bone (BPTB) graft. In our cohort of 25 cases 19 were male and 6 were female with mean age of 35.08 years, ranging from 25 to 56 years. Out of 25 ACL deficient knees treated, right knee was involved in 17 and left knee was involved in 8 patients. Associated injuries were seen in 9 cases. Figures were calculated according to IKDC formula, used to evaluate the outcomes and the final subjective IKDC scores ranged from 48 to 98.85 with an average subjective IKDC score of 88.96. Average IKDC score among male cases was 84.56 whereas in female patient was 73.95.

One patient had low grade infection with loss of graft and had poor outcome and symptomatic knee. Two of the three patients in whom an additional cancellous screw was used to fix the graft to proximal Tibia, developed local irritation due to palpable screw.

DISCUSSION -

The knee is a large and structurally complex joint. The musculature and ligamentous arrangement of the knee provides strength, protection, and stability in movement.^[3] However, despite its elaborate framework, the knee is one of the most traumatized joints in the body.

One of the most common injuries, as well as one of the most debilitating injuries to the knee joint is the tearing or spraining of the anterior cruciate ligament, or the ACL. ACL injuries cause anterolateral instability, that's why physical activity slows down; mistrust of the limb appears and all that worsens the quality of life. When the load decreases, the femoral muscles languish and all that exposes symptoms. Over the years, researchers have reported an increase in the incidence of ACL injuries.

To evaluate the effectiveness of our treatment regimen, we retrospectively studied the surgically treated knees of 25 patients, aged 25 to 56 years, who had sustained ACL tears. All were treated with

ligament excision and intraarticular bone-patellar tendon-bone reconstruction followed by early motion with emphasis on full extension. The follow-up period ranged upto 58 months.

In our study 76 % (19) of ACL injury patients were males and 24 %(6) females. Right knee was involved in 68 % (17) and left knee was involved in 32 %(8) cases. The sex related difference in outcome was not significant (SD 0.86,p value>0.05).

The patients were evaluated by objective measures (Lachman test, range of motion, and postoperative competition level) and subjective assessment scores (pain, swelling, stability, activity level, walking, stair climbing, running, jumping, or twisting) using the IKDC subjective scoring system. The International Knee Documentation Committee (IKDC) was established to unify the assessment of outcomes by developing a standardized international knee form. The original IKDC form, published in 1993 and revised in 1994, included only the minimum essential criteria necessary to evaluate results. The committee envisioned a second, more comprehensive form that would allow for valid scientific analysis of knee function. The new IKDC Subjective Knee Evaluation Form (Subjective Knee Form), published in 2000, was well tested and found to be an instrument that was valid, reliable, and responsive (Irrgang JJ, Anderson AF, Boland AL, et al, 2004)^[4] and that could be used to assess symptoms, function, and sports activity in patients with a variety of knee disorders, including ligamentous and meniscal injuries, patellofemoral pain, and osteoarthritis. More recently, it has also been shown to be significantly associated with patient satisfaction after ACL reconstruction.

As evaluated using Subjective IKDC scores in our studies 15 knees were graded as very good, 9 knees as good and one had poor outcome at an average follow up of 2.18 years. These results indicate that the IKDC Subjective Knee Form is able to differentiate patients with greater knee symptoms and lower levels of function, which lends further support for interpretation of the Subjective Knee Form score as a measure of symptoms and function during activities of daily living and sports. In summary, the IKDC Subjective Knee Form, a well-standardized outcomes instrument, is a valuable measure of symptoms, function, and ADL. The data described in the present study enhance the value of this form by providing age- and gender-adjusted values so clinicians and researchers can assess how patients are functioning and can determine the outcomes of treatment more precisely.

All except one patient belonged to younger age group with age below 45 years. Only one patient was above 45 years age (56 yrs) at the time of surgery. This patient was first given a trial of non operative treatment, but patient remained symptomatic with recurrent effusion of knee joint with pain even in activities of daily living. Patient also had medial meniscal injury at the time of presentation that is on, 30 months after injury. Hence patient was later treated surgically with arthroscopic ACL reconstruction using BPTB graft, which later resulted in good outcome.

Boden et al^[5] reported on the mechanisms of 100 ACL injuries from various sports, mainly basketball, American football, and soccer. A noncontact mechanism was reported in 72% and a contact injury in 28% of the cases. (Boden BP, 2000.^[5] On comparing this work with our series we found that, in our study 20(80 %) knee were injured by non-contact mechanism and 5(20 %) by direct contact injury. Injury involved high energy trauma in 10(40%) cases and low energy in 15(60%) cases. PCL avulsion was associated with one case of high energy trauma. This was comparable to the present work and other articles in the review. Review of the literature has shown that deep infection after ACL reconstruction occurs in 0.14% to 1.70% of patients.(Alexander Van Tongel, MD).^[6] In another study by FUJIWARA AKIRA (1999)^[7], they studied 451 ACL reconstructions performed between 1991 to 1997. In their study 6 (1.3%) patients experienced postoperative infections of the knee. In all patients, abscess peripheral outlet of the Tibial tunnel occurred. All patients had positive cultures from the knee joint or Tibial abscess aspirate staphylococcus aureus.

We observed that in our study one case had low grade infection. This patient was given prophylactic antibiotics for 48 hours after surgery still had developed pyrexia up to 100°F which settled by third day. Reconstructed ligament was stable with Lachman test grade-0 on post operative examination. Further follow up at two months, patient

developed laxity with Lachman test grade-3 and soft end point. Arthroscopic exploration revealed 80% loss of reconstructed ligament with minimal inflammation and no signs of infection in knee, the culture of synovial fluid showed no growth. Revision surgery with hamstring tendon autograft from ipsilateral limb was performed and patient was again put on exercise programme. Patient on further review at 4 months and had again developed lax ACL with grade-3 Lachman .Synovial fluid culture was done and it again showed no growth after 72 hours. A subculture was later performed which showed growth of Staphylococcus epidermidis. Patient was then given intravenous and later oral antibiotics for a total of 6 weeks to treat the infection.

In 3 cases graft was found to be short in length and surgeon felt that the fixation with interference screw will be insecure. In these cases additional graft fixation by using a cancellous screw in proximal Tibia and tightening of Tibial bone plug suture over it in required tension was done. All these patients had satisfactory graft tension on follow up with good outcome as per Subjective IKDC scores. Thus using an additional cancellous screw to fix the graft in proximal Tibia can be used as an alternative way of fixation if the graft length was short leading to unsatisfactory fixation by interference screw only.

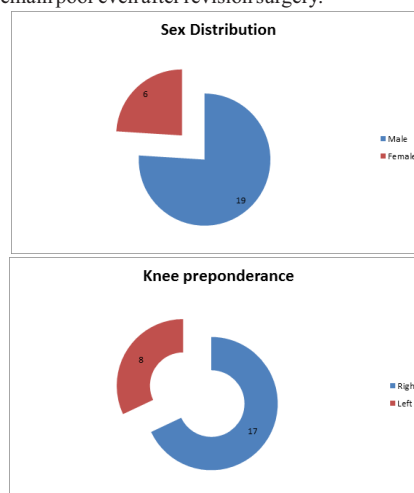
LIMITATION-

The present study has limitations; the sample size met the margin of error. Another limitation of this study was the failure to establish data for the population group younger than 25 years and athletes.

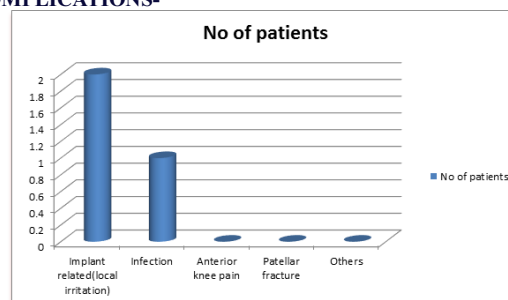
CONCLUSION -

We conclude that,

- Most of the patients (96%) are satisfied with the results of the operation.
- It is purposeful to perform ACL reconstruction operations, using the patellar tendon autograft in young adults (age<45).
- The surgical procedure, with emphasis on early full extension postoperatively, achieved excellent results and provided a stable knee.
- This procedure does not lead to any restriction of activities required in daily life in Indian subjects like squatting, sitting cross legged or kneeling.
- Prevention and early identification of infection with necessary treatment is must as once infection leads to graft failure, the results may remain poor even after revision surgery.



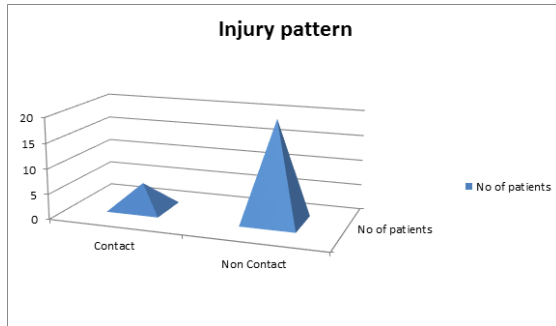
COMPLICATIONS-



Comparative table with similar study

	Bach et al. (A.J.S.M. 1998/26/20-29)	Our study
Study type	retrospective	retrospective
No. of cases	97	25
Gender	72 male/25 female	19 male/6 female
Avg. Age(at surgery)	26 years(12-53)	35 years(28-56)
Avg. follow up(in months)	79	26.16
Post op. Lachman % gr 0 / I	98 %	96%
Post op thigh girth atrophy	73%<1 cm(0-5)	60%<1cm(0-7) (avg.1.72 cm)

BAR GRAPH SHOWING INJURY PATTERN



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