A RETROSPECTIVE ANALYSIS OF ARTHROSCOPIC ACL RECONSTRUCTION WITH HAMSTRING TENDON GRAFT

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ABSTRACT

BACKGROUND

ACL reconstruction is one of the commonest knee surgeries done. Young adults are the commonest patients; thus, this injury has a large impact on socioeconomic status of the family.

The aim of the study is to study the outcome of arthroscopic ACL reconstruction with hamstring tendon graft.

MATERIALS AND METHODS

50 patients following up in the OPD who had undergone ACL reconstruction with hamstring tendon graft are evaluated. Patients who had other lesions, such meniscal injuries or collateral injuries were discarded. These patients were evaluated by using Tegner and Lysholm score of 6 months, 12 months and 24 months.

Settings- It is a retrospective analysis of the data collected from the patients who were opiated at Nair Hospital.

RESULTS

90% of patients in the study were males. Mean age of the study population is 30.7 years. All the patients in the study had instability as a symptom, while 80% of them also had pain. Six months after surgery, according to Tegner and Lysholm score, 52% patients had good outcome, while 48% had fair outcome. At 2 years, 98% of study population had excellent outcome.

CONCLUSION

Arthroscopic ACL reconstruction with hamstring graft is an effective way of treating ACL tear.

KEYWORDS

Hamstring Graft, Arthroscopic ACL Reconstruction.

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BACKGROUND

In 1845, Amedee Bonnet of the Lyon School, wrote a treatise on joint disorders causing bloody effusions in which he analysed knee injuries. He described three essential signs indicative of acute ACL rupture- "in patients who have not suffered a fracture, a snapping noise, haemarthrosis and loss of function are characteristic of ligamentous injury in the knee." His statement was based upon his clinical experience as well as on cadaver studies in which he produced knee injuries and then dissected the knee to see what lesional pattern had occurred. Reconstructions of the Anterior Cruciate Ligament (ACL) are among the most frequently performed procedures in knee surgery nowadays.

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Anterior cruciate ligament is an intra-articular, extrasynovial structure present in the central complex of knee joint. ACL restricts anterior translation of the tibia on the femur.[1] It functions in concert with all other anatomical structures in the knee joint to control and limit motion and to maintain both static and dynamic equilibrium. It is commonly injured in athletic activities like rugby, football, hockey, swimming, sprinting, gymnastics and motor vehicle accidents. Ligament disruption occurs without a fall or direct contact where deceleration along with valgus external rotation or hyperextension force comes into play.

The aim of surgical treatment is to restore knee stability, thereby allowing the patient to return to his original physical activity levels. The choice of graft and its fixation plays a key role in ACL reconstruction. An ideal graft would be one that provides as much strength as native anterior cruciate ligament, allows for secure fixation, has minimal harvest site, morbidity, enables unrestricted rehabilitation and restores normal knee biomechanics and kinematics.

The mid third bone, patellar tendon, bone and multiple stranded hamstring tendons (semitendinosus-gracilis) are the most frequently used autografts today.[2,3,4,5] The bone-

patellar tendon, bone autograft is considered to be the "gold standard" because of the bone-to-bone healing that allows for an early and accelerated rehabilitation with documented good and excellent long-term results.[5,6,7,8]

Aims and Objectives

The objective is to determine the clinical outcomes of arthroscopic ACL reconstruction in ACL tear patients reconstructed by semitendinosus and gracilis autograft by retrospective study.

MATERIALS AND METHODS

50 patients presenting with unilateral knee complaints in the Orthopaedic Outpatient Department of Nair Hospital were evaluated by a thorough general and local clinical examination of the knee. Uninjured knees of normal subjects in supine position were taken as reference. The following specific tests were performed for diagnosing ACL deficiency-

1. Lachman test.
2. Anterior drawer test.
3. Pivot shift manoeuver.

Injuries to the associated structures were assessed by performing the following clinical tests-

1. Valgus/varus stress test (for collateral ligaments).
2. McMurray's test (for menisci).
3. Posterior drawer test (for posterior cruciate ligament).
4. Reverse pivot shift test (for posterolateral complex).

Routine skiagrams of the affected knee were taken in standing position in anteroposterior and lateral views. MRI of the knee was done in cases with equivocal clinical findings.

Criteria for Selection

1. Clinical/radiological/arthroscopic evidence of ACL deficiency, which is symptomatic.
2. Young and middle-aged, active, motivated patients with future interest in professional/recreational sports or who are involved in vigorous activities, unwilling to change their active lifestyle.
3. A normal contralateral knee.
4. The acute inflammatory phase of the injury has subsided and full range of motion and good quadriceps strength has been regained with no extensor lag (usually after 4-6 weeks of injury).

Criteria for Exclusion

1. Medial collateral ligament and lateral collateral ligament tear.
2. Meniscal tear.
3. Bilateral anterior cruciate ligament deficiency.
4. Presence of fractures around the knee (tibial plateau, patella, femoral condyles).
5. Patients with sedentary lifestyle, not keen on pursuing sports in future and having minimal disability.

An informed consent was taken from the selected patients after explaining the procedure, its outcome, complications and the prolonged rehabilitation protocol to be followed subsequently.

Procedure- After giving adequate anaesthesia (spinal/spinal and epidural/general), the patient was placed in supine position. High pneumatic electronic tourniquet applied. Using a sterile Esmarch bandage, the limb was exsanguinated and the tourniquet inflated.

Diagnostic arthroscopy performed through standard anterolateral portal and diagnosis is confirmed. Working anteromedial portal taken under arthroscopic guidance.

Hamstring Graft- A longitudinal skin incision of about 4 cm was taken, cantered approximately 4 cm medial and just distal to the tibial tubercle or about three finger width below the medial joint line. Semitendinosus tendon was hooked under Pes anserinus fascia. Deep fascial bands were dissected. Open-end stripper was passed over the tendon one by one and advanced carefully in line with it giving firm, steady, but gentle pressure and simultaneously applying countertraction using the previously placed suture. They were stripped off their residual muscle fibers proximally using the blunt end of scalpel blade. They were placed together and using a #5 Ethibond suture a running baseball stitch was placed in both tendons in a Chinese finger trap configuration. The tendons were looped using a Mersilene tape around the stitch.

TUNNEL PLACEMENT

Tibial Tunnel- The tibial guide was introduced into the joint through the anteromedial portal after setting the inclination of the zig at 55 degrees. The aimer was placed on the center of the tibial footprint, which lies about 6 mm anterior to the PCL in the midpoint and just medial to the posterior edge of the anterior horn of lateral meniscus. A guidepin was drilled into the joint through the sleeve. The tunnel was then reamed with a cannulated headed reamer placed over the guidepin starting from 8 mm size upto the size determined by graft sizer.

Femoral Tunnel- Femoral offset guide was introduced into the joint through the tibial tunnel and engaged into "over the top" position with the knee in 90° flexion. The guide was aimed at 2 o'clock position in the left knee and 10 o'clock in the right knee.

Graft Placement and Fixation Hamstring Graft

The guidepin was then drilled through the intercondylar region and lateral femoral cortex to emerge out of the anterolateral aspect of the thigh.

An appropriate-sized cannulated calibrated reamer was threaded over the pin and femoral tunnel reamed upto the 40 mm mark on the calibrated reamer.

The graft was passed through the tibial tunnel and up into the femoral socket.

With the help of titanium Endobutton, Mersilene tape, Ethibond No. 2, Vicryl No. 1, the flip-flop technique was

adopted. The graft was then placed under tension and knee was cycled several times to remove "creep" from the graft construct. The knee was then placed in about 20-30 degrees of flexion, an appropriate-sized headless titanium screw (usually, same size of the diameter of tibial tunnel) was inserted into the tibial tunnel until it was buried just below the cortex. If fixation was found to be inadequate, a staple was used in addition just distal to the tibial tunnel.

Outcome Measures- The outcome of ACL reconstruction were based on "Tegner and Lysholm Score."[9] It consist of 8 question, which are scored accordingly. Following are the parameters-

• Limp (5 points)	
None	5
Slight or periodical	3
Severe and constant	0
• Support (5 points)	
None	5
Stick or crutch	2
Weightbearing impossible	0
• Locking (15 points)	
No locking or catching sensation	15
Catching sensation, but no locking	10
• Locking	
Occasionally	6
Frequently	2
Locked joint on examination	0
• Instability (25 points)	
Never giving away	25
Rarely during athletics or severe	20
• Exertion	
Frequently during athletics or severe	15
• Exertion	
Occasionally in daily activities	5
Every step	0
• Pain (25 points)	
None	25
Slight and inconstant during	20
• Severe exertion	
Marked during severe exertion	15
Marked on or after walking more than 2 km	10
Marked on or after walking less than 2 km	5
Constant	0
• Swelling (10 points)	
None	10
On severe exertion	6
On ordinary exertion	2
Constant	0
• Stair climbing (10 points)	
No problem	10
Slightly impaired	6
One step at a time	2
Impossible	0
• Squatting (5 points)	
No problem	5
Slightly impaired	4
Not beyond 90 degrees	2
Impossible	0

Table 1

All knees were examined before surgery in the operating room immediately after the procedure and at 6 and 12 months and 24 months. Patients was examined in the outpatient department by the same surgeons and they were given a questionnaire based on "Tegner and Lysholm score" and these scores were calculated and outcome determined. The patient with score <65 were graded as poor 65-83 were graded as fair 84-89 were good and >90 excellent.

RESULTS

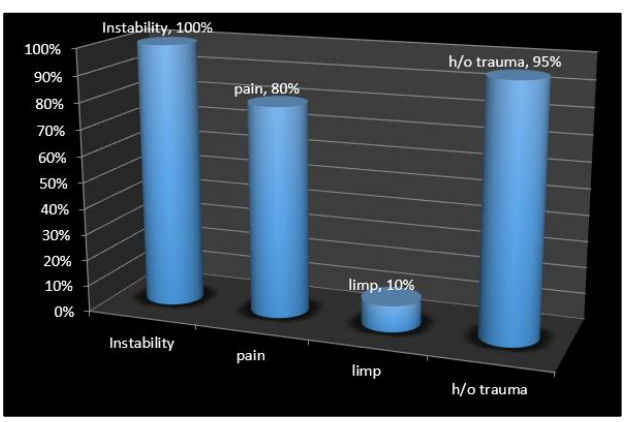
Baseline Statistics- The study comprised of a cohort of 50 patients of which 45 patients (90%) were males. The mean age was 30.7 (range 20 to 50). Nearly, all the patients with anterior cruciate ligament tear had instability preoperatively, which was not there after the operative management. Most of the patient resumed their respective activities 6 weeks after the surgery and were comfortable doing exertional activities after 6 months. We had used Tegner and Lysholm score to determine the outcome of arthroscopic ACL reconstruction in a patient with ACL tear. Most of these patients have complaints of pain and instability before the surgery. Most of the patients were engaged in some exertional activities.

Sex	Male	Female
N=50	45	5

Table 2. Sex Distribution

Sports Activity	Yes	No
N=50	40	10

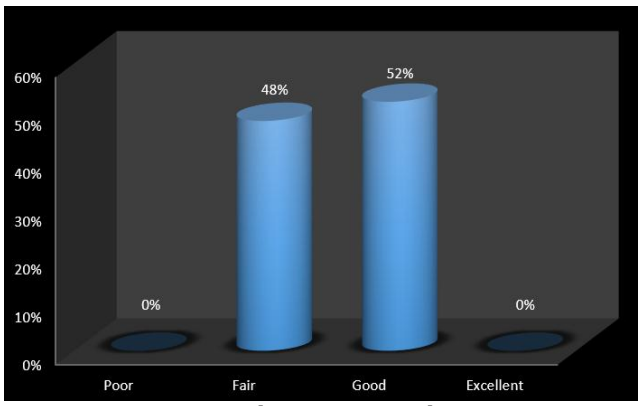
Table 3. Activity



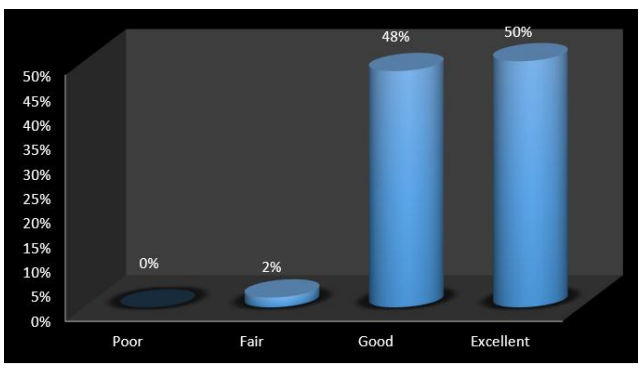
Graph 1. Distribution of Knee Symptoms (Preoperative)

	Poor (<65)	Fair (65-83)	Good (84-90)	Excellent (>90)
6 Months	0	48%	52%	0%
12 Months	0	2%	40%	58%
24 Months	0	0	2%	98%

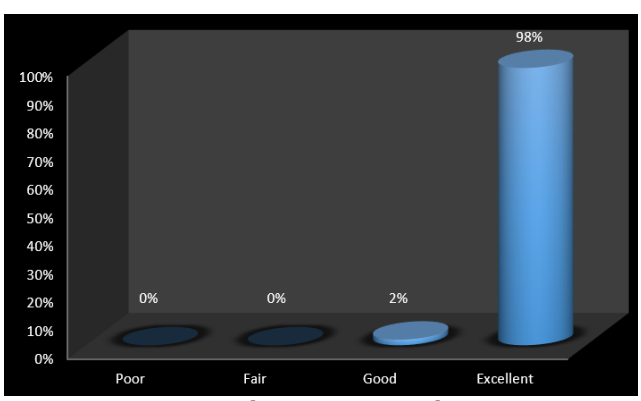
Table 4. Outcome of Patient Based on Tegner and Lysholm



Graph 2. At 6 Months



Graph 3. At 12 Months



Graph 3. At 24 Months

Nearly, all the patients with ACL tear had history of instability preoperatively with pivot shift test positive on operation table under anaesthesia. Postoperatively, patients were rehabilitated gradually. After 6 months, 52% patients showed good results and 48% showed fair results. They were doing their daily routine activities without any problem. Only few patients had complaints of pain, which subsided gradually with a span of time. After 12 months, 58% patients showed excellent results and 42% showed good results. Nearly, all the patients had no problems in doing their exertional activities as well. After 24 months, 98% showed excellent results and only 2 percent showed good results. Nearly, all the patients were active as they were before the trauma and their activities were the same as they were with no major problem at all.

DISCUSSION

Successful clinical outcomes following anterior cruciate reconstruction with a hamstring graft have been reported by many authors.[10-20] In our study, anterior cruciate reconstruction with a hamstring graft resulted in a successful clinical outcome in almost all the patients who had come for followup.

Nebelung et al reviewed the results of 29 anterior cruciate reconstructions with an autogenous semitendinosus gracilis tendon and a femoral Endobutton.[21] They graded 66% of the results as normal or nearly normal using the criteria of the International Knee Documentation Committee. In the present study, we analysed the effectiveness of a semitendinosus gracilis graft in eliminating symptomatic anterior tibial subluxation caused by a torn anterior cruciate ligament. Anterior tibial subluxation was eliminated in almost all the patients who had followed up for 2 years.

With the rehabilitation protocol used in our study, the majority of patients returned to a high functional status in 6 months. No motion deficits or clinically important knee pain was noted at the followup examination. Other authors have reported success with similar rehabilitation protocols following anterior cruciate reconstruction.[22,23,24]

Hoffmann et al reported in the results, 65 patients of anterior cruciate reconstruction with semitendinosus gracilis graft and Endobutton construct that was augmented with an extra-articular lateral repair.[25]

In this study, no patients who were treated by hamstring graft reconstruction for ACL tear didn't require extra-articular lateral repair.

Bach et al reported a reoperation rate of 15% in a series of 103 patients evaluated two years after anterior cruciate reconstruction with a patellar tendon autograft.[26] In this study, all the patients were treated with hamstring graft and no reoperation was required.

In their study of 2500 consecutive arthroscopically-assisted anterior cruciate reconstructions performed Williams et al reported an infection rate of 0.03%.(27) One patient had a superficial infection of the knee following the anterior cruciate reconstruction. In our study, patients were treated effectively by a combination of parenteral and oral antibiotics for a total of 2 weeks and no postoperative infection was noted in the follow up patients.

We did not observe any clinically relevant knee pain or motion loss at the time of follow-up. The absence of such morbid findings following anterior cruciate reconstruction with a hamstring graft makes this method of reconstruction more desirable for the patients with ACL tear.

CONCLUSION

We found that ACL reconstruction by semitendinosus-gracilis autograft with a torn anterior cruciate ligament in nearly all the patients who were available for follow-up. Significant improvements in functional scores were noted. Arthroscopic ACL reconstruction is an effective treatment option for patients with symptomatic ACL tears without any concerns regarding knee extensor mechanisms or anterior knee pain.

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