



Arthroscopic Reconstruction of Anterior Cruciate Ligament Using Semitendinous & Gracilis Tendon Autograft

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Abstract

Introduction: *The Anterior Cruciate Ligament is the weaker of the two cruciate ligaments and therefore may be it tears easier than the Posterior Cruciate Ligament.¹ Anterior knee instability associated with rupture of the ACL is a disabling clinical problem. The ACL has a poor capacity for intrinsic repair. Thus patients who have knee symptoms related to ACL deficiency, may consider ligament reconstruction as a means of stabilizing the tibio-femoral joint and restoring high level function of the knee joint.*

Method: *The study will be a prospective study of 30 consecutive patients who underwent arthroscopic ACL reconstruction using semitendinosus tendon & gracilis tendon autograft, skeletally mature patients with ACL tear confirmed by Lachman test with concomitant meniscal injury that required repair included in the study,. the study done at Department of Orthopaedics Katihar Medical College, Katihar.*

Result: *The mean age in our study was 29 years. The maximum number of patients were in the age group of 41-50yrs (36.67%) with male predominance. Most of the ACL tears were caused by road traffic accidents (44%). All patients presented with complaints of giving way of the knee. 83.33% of the patients were able to appreciate the clicking of knee. Lachman test and Anterior drawer test was found to be 90% positive. The single Hoop test preoperative index ranges from 22.72 to 57.14 with a mean of 44.355. Post operatively the index improved to a mean of 83.503 ranging from 66.36 to 93.33. 87% of the patients were able to return to their pre injury activity including farming and to competitive sports.*

Conclusion: *The functional outcome of anterior cruciate ligament reconstruction with quadrupled semitendinosus tendon autograft is excellent to good (90%) with mild laxity at the end of 6 months.*

Introduction

Anterior Cruciate Ligament (ACL) injury is the most controversial ligamentous injury and has been studied extensively all over the world in the past 20yrs. The Anterior Cruciate Ligament is the weaker of the two cruciate ligaments and therefore may be it tears easier than the Posterior Cruciate Ligament.¹

Anterior knee instability associated with rupture of the ACL is a disabling clinical problem. The

ACL has a poor capacity for intrinsic repair. Thus patients who have knee symptoms related to ACL deficiency, may consider ligament reconstruction as a means of stabilizing the tibio-femoral joint and restoring high level function of the knee joint. Numerous methods are available for successful reconstruction of the ACL with use of a donor autograft (patellar tendon, hamstring tendon or quadriceps tendon) and allograft (Achilles, patellar tendon, hamstring tendon or tibialis

anterior) tendons. Anterior Cruciate Ligament Reconstruction has been attempted using Silver wire², Fascia lata³, and Iliotibial band⁴. Semitendinosus and gracilis tendon represent an alternative autograft donor material that may be used for reconstruction of the ACL without disturbance of the extensor mechanism.

Arthroscopically assisted Anterior Cruciate Ligament Reconstruction has the advantage of being minimally invasive, accurate graft placement, less disturbance of normal tissue resulting in quicker recovery and rehabilitation, minimal hospital stay and very less infection rate.

Aims and Objectives

To study the functional outcome and complication of arthroscopic anterior cruciate ligament reconstruction using semitendinosus & gracilis autograft.

Material and Methods

The study will be a prospective study of 30 consecutive patients who underwent arthroscopic ACL reconstruction using semitendinosus tendon & gracilis tendon autograft. The study done at Department of Orthopaedics Katihar Medical College, Katihar. Patients are skeletally mature with ACL tear confirmed by Lachman test with concomitant meniscal injury that required repair included in the study, provided that they were permitted to undergo rehabilitation after ACL reconstruction involving full weight – bearing gait and unrestricted non weight bearing range of motion.

Exclusion Criteria

Patients with ACL avulsion injury. Anterior cruciate ligament tear with Concomitant posterior cruciate ligament, collateral ligament injuries requiring surgery or posterolateral corner injury. Anterior cruciate ligament tear associated with the bony injury around the knee. Patients undergoing revision ACL reconstruction. Concurrent musculoskeletal condition, eg, back, hip, or ankle injury on either extremity.

Surgical Technique

Initial Arthroscopy

The patient receives intravenous antibiotics preoperatively. After induction of anaesthesia, the patient will be positioned supine and a tourniquet applied on the upper thigh of the operative leg.

An examination under anaesthesia will be performed. Diagnostic arthroscopy performed through an anteromedial and anterolateral portals.

Graft Harvest and Preparation

Make a 3 - 4 cm incision anteromedially on the tibia starting approximately 4 cm distal to the joint line and 2 cm medial to the tibial tuberosity. Expose the pes anserinus insertion with subcutaneous dissection. Palpate the upper and lower borders of the Sartorius tendon, and identify the palpable gracilis and semitendinosus tendons 3 to 4cm medial to the tendinous insertion. Make a short incision in the line with the upper border of the gracilis tendon, and carry the incision just through the first layer, taking care not to injure the underlying medial collateral ligament. With the pes retracted medially, the gracilis and semitendinosus tendons visible on the medial side. The more proximal thicker of the two tendons will be the gracilis and below it the more horizontal semitendinosus tendon. After the tendons have been positively identified, the semitendinosus tendon pulled forward with a curved clamp and snared with a braided suture. With Metzenbaum scissors, carry the dissection proximally up the thigh. Stay in the same plane, and maintain adequate exposure by using properly placed retractors. Then semitendinosus tendon will be released from its tibial insertion. The insertion site, including the periosteum, will be widely circumscribed with a knife and undermined with a periosteal elevator. After carefully releasing the tendon from its insertion, place a double Krackow – type whipstitch with vicryl near the insertion of the tendon and release its fibrous extension to the gastrocnemius and semimembranosus muscles. Palpate all sides of the tendon to ensure there are no fibrous extensions before releasing it with an

open – end tendon stripper. If firm resistance will be felt, redissect around the tendons with a periosteal elevator and Metzenbaum scissors. Release the tendon proximally by controlled tension on the tendon, while advancing the stripper proximally. The muscle should slide off the tendon as the stripper will be advanced proximally.

The surgical assistant prepares the tendons on the ACL Graft master on the back table. The Graft master allows for pretensioning and control of the tendons during preparation. Residual muscle tissue will be stripped from the tendon with a blunt elevator. The overall length of the tendon measured. The tendon will be cut in half to make two segments of equal length. Place a double Krackow-type whipstitch in both ends of each tendon with No. 2 Ethibond. Each segment will be looped to create a total of four strands and graft size measured with the tendon sizer. Place a running, interlocking No. 2-0 non absorbable Krackow-type whipstitch in each end of the loop so that the graft can be passed as a single graft. The prepared graft is then placed under tension, covered by a wet saline gauze, for 20 to 30 minutes on the graft master.

Tibial and Femoral Tunnel Preparation

When placing the tibial guide, be aware of the intended tunnel length and direction so that the graft can be secured in a physiometric, impingement free position. Intraarticular reference points that can serve as guides include the anterior cruciate ligament stump, the inner edge of the anterior horn of the lateral meniscus, the medial tibial spine, and the posterior cruciate ligament. Next a cannulated reamer of the appropriate diameter will be advanced over the guide pin. The diameter of the reamer used for the tibial tunnel will be determined by sizing the harvested hamstring graft. With the knee flexed approximately 90 degrees, confirm the previously chosen femoral pilot hole with an Arthrex 7-mm offset femoral guide passed through the tibial tunnel. Ensure that 1 to 2mm of bone remains as a

posterior wall. The starting point will be at the 10:30-o'clock position on the right knee (1:30-o'clock position on the left knee) approximately 8 mm lateral to the posterior cruciate ligament. Advance a long guide wire through the guide to the chosen physiometric point on the posterolateral portion of the femoral condyle. Advance the wire so that it exits the distal anteromedial femoral cortex. The tibial side of the graft will be fixed with interference srew. Further the fixation will be strengthened by ethibond threads.

Wound Closure

Thorough lavage of the joint will be done to clear off the debris. Graft harvest site sutured in layers with no 2-0 vicryl. Skin sutured with ethilon. Compression bandage dressing done and long knee extension brace will be applied.

Result

1) Age Distribution

The mean age in our study was 41 years. The youngest patient was 20yrs and the oldest patient was 68 years old. The maximum number of patients were in the age group of 41-50yrs (36.67%).

Table No 1: Age distribution

Age in years	Number	Percentage
20-30	7	23.33%
31-40	7	23.33%
41-50	11	36.67%
51-60	3	10%
61-70	2	6.67%
Total	30	100%

2) Sex Distribution

Shows male predominance (83.33%)

Table No 2: sex distribution

	FREQUENCY	PERCENTAGE
MALE	25	83.33%
FEMALE	05	16.67%
TOTAL	30	100%

3) Nature of Injury

Most of the ACL tears were caused by road traffic accidents (44%). Next common cause was sports activities like foot ball, kabbaddi and athletics like jumping, police physical training, etc.

Table No 3: Nature of Injury

	FREQUENCY	PERCENT
RTA	13	44%
SPORTS	10	33%
FALL	07	23%

4) Presenting Symptoms

Table No 4: Presenting Symptoms

SYMPTOMS	FREQUENCY	PERCENTAGE
PAIN	12	40%
SWELLIING	20	66.67%
GIVING WAY	30	100%
LOCKING	14	46.67%
CLICKING	25	83.33%

5) Clinical Evaluation of Laxity in OPD

Lachman test and Anterior drawer test was found to be 90% positive which was grade 3 in 46.67% and grade 4 in 53.33%, and pivot shift test, 56.67% sensitive by clinical examination

Table No 5: Shows Clinical Evaluation

CLINICAL EXAMINATION	NUMBER	PERCENTAGE
Lachman test	27	90
Anterior drawer test	27	90
Pivot shift test	20	66.67

6) Frequency of Associated Injuries on MRI

Medial meniscal tear was the commonest associated injury (46.67%) detected by MRI followed by lateral meniscus (20%) and grade 1 medial collateral ligament injury (10%) not requiring surgery. There was no lateral collateral ligament and PCL injury.

Table No 6: Frequency of associated injuries on MRI

	Yes		No	
	No	%	No	%
MM	14	46.67	16	53.33
LM	06	20	24	80
MCL	03	10	27	90
LCL			30	100
PCL			30	100

7) Complications

Table No 7: shows complications

	YES	%	NO	%
GRAFT SITE MORBIDITY				
PAIN	04	13.33%	26	86.67%
SUPERFICIAL INFECTION	02	06.67%	28	93.33%
DEEP INFECTION	00	00.00%	30	100%
NUMBNESS	01	03.33%	29	96.67%

LAXITY	23	76.67%	07	23.33%
CLICK	02	06.67%	28	93.33%
FFD	01	03.33%	29	96.67%

8) Post Operative Outcome

8A) IKDC Scoring

70% of the patients graded their post operative recovery as normal and 20% as near normal whereas 3 patients (10%) graded recovery as abnormal.

8B) LSG Scoring

Table No 8: Post Operative Outcome -- LGS Scoring

	FREQUENCY	PERCENTAGE
EXCELLENT	18	60%
GOOD	10	33.33%
FAIR	02	06.67%
POOR	00	00.00
TOTAL	30	100%

8C) SQ – Scoring

Table no 9: Post Operative Outcome – SQ

	FREQUENCY	PERCENT
VERY SATISFIED	20	66.67%
SATISFIED	10	33.33%
NOT SATISFIED	00	00.00%
TOTAL	30	100%

9) Single Hop Test

Limb symmetry index was calculated by the percentage of affected limb over the normal limb. The preoperative index ranges from 22.72 to 57.14 with a mean of 44.355. Post operatively the index improved to a mean of 83.503 ranging from 66.36 to 93.33.

Table no 10: Single hop test

Limb Symmetry Index	Minimum	Maximum	Mean
Preoperative	22.72	57.14	44.355
Postoperative	66.36	93.33	83.503

10) Return to Pre Injury Level of Activity

83.33% of the patients were able to return to their pre injury activity including farming and to competitive sports. 16.67% patients were not satisfied with physiotherapy regimen and these patients were noncompliant to the protocol.

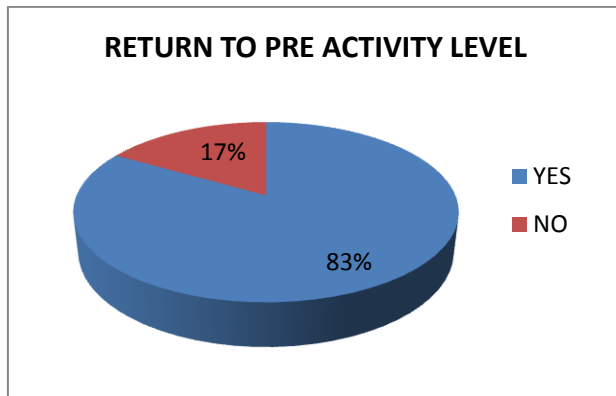


Chart No 1: Return to pre injury level of activity

Discussion

Andrea Reid et al, in March 2007, published their results of a series of hop tests on 42 patients, 15 – 45 years of age who had undergone ACL reconstruction⁵. The mean limb symmetry index in above study was calculated at the 22nd postoperative week against at 24th postoperative week in our study. The mean values of above study were all above 85%. In our study the mean value is around 83%.

Gulick TD⁶ and others in 2002 studied on 57 patients and concluded that 84% of their patients returned to pre injury level of function. In our study 83% patients returned to their previous level of function.

Conclusion

The functional outcome of anterior cruciate ligament reconstruction with quadrupled semitendinosus tendon autograft is excellent to good (90%) with mild laxity at the end of 6 months.

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