

Bone Patellar Tendon Bone versus Semitendinosus-Gracilis Graft in ACL Reconstruction- 3 Years Follow Up

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Abstract

Background: The purpose of the investigation was to evaluate replacement of torn anterior cruciate ligament (ACL) with either a bone-patellar tendon-bone (BPTB) autograft or a two strand semitendinosus-gracilis (ST-G) autograft to compare the results of clinical testing, patient satisfaction, activity level, functional status and muscle strength.

Materials and Methods: 78 patients with a torn ACL were enrolled in a retrospective randomized controlled study. 40 underwent reconstruction with a BPTB autograft, and 38 were treated with a two-strand ST-G autograft. Patients were followed for 3 years. They were evaluated in terms of clinical test findings, patient satisfaction, activity level, functional status and muscle strength.

Results: The objective outcome of replacement of the torn ACL with a BPTB graft was superior to that obtained with a two strand ST-G graft. At the 3 years follow-up interval, the patients in whom a hamstring graft had been used had increased anterior knee laxity compared with the laxity of the contralateral normal knee, whereas the patients in whom a BPTB graft had been used had lesser knee laxity. At the same follow-up interval, the patients in whom a hamstring graft had been used had significantly lower knee-flexion strength than those who had a BPTB graft. In contrast, the two treatments produced similar outcomes in terms of patient satisfaction, activity level, and knee function (ability to perform a one-legged hop, bear weight, squat, climb stairs, run in place and duckwalk)⁵.

Conclusion: After 3 years of follow-up, the objective results of ACL reconstruction with a BPTB autograft were superior to those of replacement with a two strand ST-G graft with regard to knee laxity, pivot-shift grade, and strength of the knee flexor muscles. However, the two groups had comparable results in terms of patient satisfaction, activity level and knee function.

Keywords: Anterior cruciate ligament; Bone patellar tendon; Semitendinosus; Gracilis

Introduction

ACL is the commonest knee ligament to get completely ruptured in trauma^{1, 3}. Young, active, athletic individuals are the most frequent sufferers predisposing them to degenerative changes in the tibiofemoral joint^{1, 2, 7}. Decades ago, before the

arthroscopic management, it was thought that only the sportspersons would need surgery for a ruptured ACL. The concept has changed⁶. It is now recognised that even a moderately-active, non-athletic individual can have significant disability from recurrent episodes of knee instability and operation is justified

even in them^{10, 11}. Arthroscopic ACL reconstruction has markedly reduced the postoperative morbidity as compared to the previously used open methods^{6, 8}. BPTB was the earliest explored autograft material and arguably the most successful one so much so that it is the defacto 'gold standard' against which the results of other graft materials are evaluated⁹. Some of the technical difficulties and morbidities of this procedure, however, lead to the exploration of other materials as graft source¹². The proven alternative is the 4-strand ST-G graft^{12, 13}. Biomechanical tests have proven the superiority of the 4-strand ST-G over a 10-mm BPTB in vitro^{11, 14, 15}. Various authors have described the pros and cons of the clinical aspects of these grafts^{10, 15, 16}. This retrospective study aimed to analyse the results in patients of arthroscopic ACL reconstructions with one of these two types of grafts, at a minimum of 3 yrs post-op followup.

Materials And Methods:

Between 2012 and 2016, 112 patients of ACL rupture (all unilateral) were treated by arthroscopic ACL reconstruction. From hospital records, 78 cases were selected. Only those having a followup of at least 3

yrs were chosen in this study. All the surgeries were performed by surgeons having experience of more than 100 ACL reconstructions prior to this study, so there was no learning-curve issue in any of these patients.

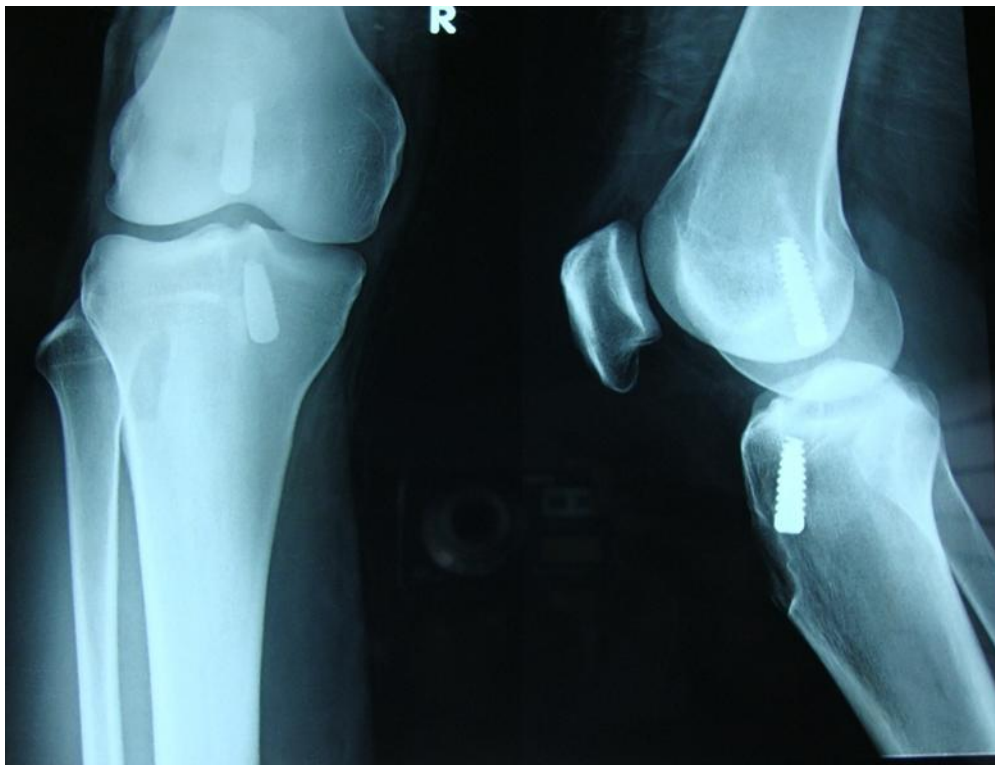
Exclusion Criteria

History of previous injury or operation on either knee or if they had a concurrent fracture, osteoarthritis or injury of the posterior cruciate ligament, lateral collateral ligament, or posterolateral corner of the knee or a grade-III tear of the medial collateral ligament.

Pre-operative assessment by proforma which included biodata, mode and date of index injury, pre-trauma level of activity/ athleticism, frequency of instability and the degree of disability being caused by the rupture, condition of the knee and surrounding muscles, ROM, laxity in AP, mediolateral and rotational planes and imaging studies.

Steps- Anesthesia, tourniquet, EUA findings, routine arthroscopy, graft harvesting, ACL reconstruction¹⁷.

Technique:



BPTB fixation: Interference screws in femur and tibia



Semi-TG fixation: Endobutton and polyester (Mersilene™ tape in femur, Suture-wheel or Lag screw-washer as post to tie no.5 polyester suture (Ethibond™ or equivalent)

Postoperative protocol of rehabilitation and followup schedule were similar in all cases irrespective of the graft used. The patients were examined regularly upto 3 years.

Proforma of followup assessment

Scar tenderness, swelling, wasting

ROM

Sensory change lateral to tibial tubercle

Muscle power

Lachman^{11, 12}

Pivot shift^{11, 12}

Satisfaction.

Level of activity – preinjury vs 1 year and 3 years (Tegner activity^{15, 17})

Points in Tegner-Lysholm^{15, 17}

Answer to the question “will u accept the same surgery if ur other knee gets same injury?” etc



3 years followup: ACL reconstruction with BPTB graft



3 years followup: ACL reconstruction with ST-G graft

Results:

Lachman Test data

Tested clinically and graded as 0, 1+, 2+, 3+^{10, 11}

No significant differences in the findings of the Lachman test between the treatment groups preoperatively or at the one-year interval; however, the patients with a semitendinosus-gracilis graft had a significant increase at three years.

Pivot Shift data

There was no difference in the findings of the pivot shift examination^{10, 11} between the treatment groups preoperatively or at the one-year interval; however, the patients with a ST-G graft had a significant increase in grade at three years.

Conclusion:

Tegner Activity Score^{15, 17} and International knee documentation committee (IKDC) Activity Grade^{8, 13}

There was no difference in activity levels between the treatment groups at the preoperative, one and three years interval.

Extension and flexion strength- measured clinically. There was no difference in extension strength values between the treatment groups at the one and three years interval. However, the patients with the ST-G graft had a significant deficit in flexion strength at compared with those with the BPTB graft at three years.

Duck-walking and knee-walking: not very useful clinically

	BPTB	SEMI T-GRACILIS
POST OP PAIN	MORE	LESS
POST OP SWELLING	MORE	LESS
REHAB	MORE AGGRESIVE	LESS
STABILITY	GOOD EARLY STABILITY, MAINTAINED SAME AT 1-6 YRS	GOOD EARLY STABILITY, MAINTAINED AT 1YR BUT SIGNIFICANTLY LESS AT 6 YRS

ANAESTHETIC PATCH	FREQUENT	INFREQUENT
STIFFNESS	SOME CASES OF MILD STIFFNESS	NONE
DONOR SITE MORBIDITY	EARLY MORBIDITY BUT NOT MUCH AT 6 YRS	NONE
KNEELING	SOME CASES	NONE
KNEE WALKING PROBLEM	SOME CASE	NONE
DUCK WALKING	SUPERIOR	INFERIOR
EXTENSOR LAG	NONE	SOMETIMES PRESENT
WOUND DEHISCENCE	LESS	MORE

After 3 years of follow-up, the objective results of ACL reconstruction with a BPTB autograft were superior to those of reconstruction with a two-strand ST-G graft with regard to knee laxity, pivot-shift grade, and strength of the knee flexor muscles. However, the two groups had comparable results in terms of patient satisfaction, activity level, and knee function.

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