

Patellar tendon or hamstring graft anterior cruciate ligament reconstructions in patients aged above 50 years

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ABSTRACT

Background: The treatment of anterior cruciate ligament (ACL) injury consists of arthroscopic ACL reconstruction with patellar tendon or hamstring graft. Satisfactory results have been reported so far in the younger age group. Dilemma arises regarding the suitability of ACL reconstruction in patients aged 50 years and above. This retrospective study analyses the outcome of ACL reconstruction in patients aged 50 years and above.

Materials and Methods: 55 patients aged 50 years and above presented to our institution with symptomatic ACL tear and were managed with arthroscopic reconstruction with patellar tendon/hamstring graft. 22 patients underwent ACL reconstruction with bone- patellar tendon-bone graft and the remaining 33 with a hamstring graft. Evaluation of functional outcome was performed using International Knee Documentation Committee (IKDC) and Lysholm scoring in the preoperative period, at the end of 1 year and at the final followup. Radiographic evaluation was performed using the Kellgren–Lawrence grading system.

Results: The mean preoperative IKDC score was 39.7 ± 3.3 . At the end of 1-year following the operation, the mean IKDC score was 73.6 ± 4.9 and at the final followup was 67.8 ± 7.7 . The mean preoperative Lysholm score was 40.4 ± 10.3 . At the end of 1-year following the intervention, the mean Lysholm score was 89.7 ± 2.1 and at final followup was 85.3 ± 2.5 . Overall, 14 out of 42 patients who underwent radiographic assessment showed progression of osteoarthritis changes at the final followup after the intervention.

Conclusion: In our study, there was a statistically significant improvement in the IKDC and Lysholm scores following the intervention. There was a slight deterioration in the scores at the final followup but the overall rate of satisfaction was still high and most of the patients were able to do their routine chores and light exercises suitable for their age group. Around one-third of patients show progression of radiographic changes in the postoperative period and this requires long term evaluation.

Key words: Bone patellar tendon- bone graft, hamstring, International Knee Documentation Committee, anterior cruciate ligament

MeSH terms: Anterior cruciate ligament, anterior cruciate ligament reconstruction, arthroscopy, grafts, ligaments, articular

INTRODUCTION

Anterior cruciate ligament (ACL) injury is the most common sportsrelated injury to the knee encountered in orthopedic practice. In patients with symptomatic knee instability related to ACL injury, management consists of arthroscopic ACL reconstruction

with bone-tendon-bone graft (BTBG) or hamstring graft. Satisfactory results have been reported so far in middle-aged patients who have undergone ACL reconstruction.¹ This study evaluates the intermediate term results of arthroscopic ACL reconstructions in patients aged 50 years and above at the time of intervention. We have also studied the effect of the choice of the graft (patellar bone-tendon-bone (BTB) vs. hamstring graft) on the outcome of ACL reconstruction in this group of patients.

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MATERIALS AND METHODS

This study was a retrospective analysis of 55 patients aged 50 years and above who underwent ACL reconstruction. Inclusion criteria were as follows – patients aged 50 years and above; presence of ACL injury with or without concomitant meniscal injury and degenerative changes in the knee up to grade 2 change on the Kellgren–Lawrence radiographic grading system. Exclusion criteria included patients aged below 50 years, presence of concomitant

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posterior cruciate ligament injury, peripheral vascular disease, and grade 3 or 4 degenerative changes on the radiographs. There were 45 male patients (82%) and 10 female (18%) patients. Associated injuries included medial meniscal tears in 14 patients, lateral meniscal tears in 5 patients, tears of both menisci in 7 patients. None of the patients had significant focal chondral defects (grade 3 and above changes on modified Outerbridge classification) that required intervention. The mean age of patients was 53.8 years (range 50–66 years). Six patients were aged above 60 years. The mean followup period was 46.2 months (range 24–72 months).

In total 22 patients underwent arthroscopic ACL reconstruction with patellar BTB graft and 33 patients underwent arthroscopic ACL reconstruction with 4-strand hamstring graft. BTB graft was used only in those patients without retropatellar pain and chondromalacia. Partial meniscectomy was performed in those patients with meniscal tears. In patients with BTB graft, mobilization was started the following day with 50% weight bearing for the initial 2 weeks. Full weight bearing was allowed after 2 weeks. In patients with hamstring grafts, mobilization was started on the following day with 50% weight bearing and full weight bearing was allowed after 3 weeks. Range of motion exercises was started in both groups of patients from the 1st postoperative day.

Patients were evaluated for range of knee motion, and laxity using the Lachman test and KT 1000 arthrometer (Med Metric Corp, San Diego, USA). Evaluation of functional outcome was performed using International Knee Documentation Committee (IKDC)² and Lysholm scoring³ in the preoperative period, at the end of 1-year following the operation and at the final followup. Radiographic evaluation was performed using the Kellgren–Lawrence grading system.⁴ 42 patients were evaluated clinically and radiographically and in the remaining 13 patients, IKDC and Lysholm scores were obtained through telephonic interview at the time of final followup.

Data analysis was done using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta. Student's *t*-test was used to test the significance of the difference between quantitative variables and Yate's and Fisher's Chi-square tests for qualitative variables. A "*P* < 0.05" is taken to denote significant relationship.

RESULTS

The mean preoperative extension and flexion were

2° (range – 3–8°) and 132° (range 122–150°). The mean postoperative extension and flexion were 1° (range – 5°–3°) and 137° (range 125–150°). Preoperatively, the Lachman test was graded as 1 + in 10 knees, 2 + in 27 knees and 3+ in 18 knees. Postoperatively, the Lachman tests were graded as 0 in 19 knees, 1 + in 28 knees, and 2 + 8 in knees. The mean translation on KT-1000 arthrometer in preoperative patients was 7.2 mm (range 5–14 mm) and it reduced to a mean of 2.4 mm (range 2–4 mm) in the postoperative period.

The mean preoperative IKDC score was 39.7 ± 3.3 [Figure 1]. At the end of 1-year following the operation, the mean IKDC score was 73.6 ± 4.9 and the mean IKDC score at the final followup was 67.8 ± 7.7 . It can be seen that most of the patients had IKDC scores at 1-year followup were between 70 and 80 ($n = 37$) and 60 and 70 ($n = 14$). Three patients had scores between 80 and 90. None of the patients had scores above 90 or below 60. IKDC scores at final followup showed that four patients had scores between 80 and 90. 15 patients had scores between 70 and 80. 30 patients had scores between 60 and 70 and 6 patients had scores between 50 and 60. The IKDC score was found to have upgraded in only one patient at the final followup. The difference between the preoperative IKDC scores and IKDC scores at the end of 1-year showed statistically significant improvement ($P < 0.0001$). Twenty-two patients showed deterioration in their IKDC scores at the time of final followup. Even with slight deterioration of scores, the IKDC scores at final followup still showed significant improvement over preoperative IKDC scores ($P < 0.0001$).

The mean preoperative Lysholm score was 40.4 ± 10.3 [Figure 1]. At the end of 1-year following the intervention, the mean Lysholm score was 89.7 ± 2.1 and at the final followup, the mean Lysholm score was 85.3 ± 2.5 . The difference between preoperative Lysholm scores and Lysholm scores at the end of 1-year showed statistically

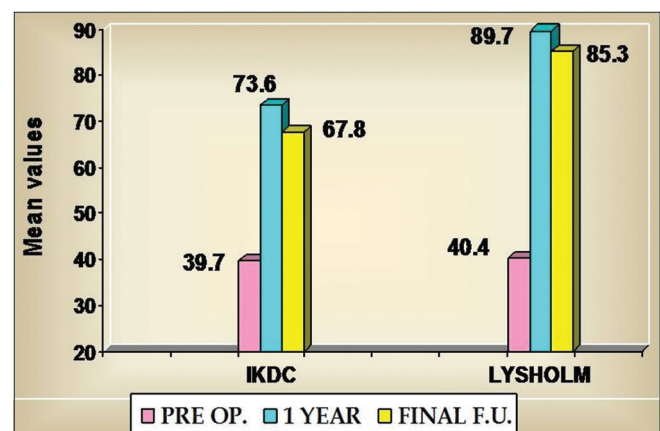


Figure 1: Bar diagram showing IKDC and Lysholm scores preoperative, at 1yr and final followup. Pre Op = Preoperative, F.U. = Followup

significant improvement ($P < 0.0001$). There was deterioration in the Lysholm score at final followup. Even with slight deterioration of scores, the Lysholm scores at final followup still showed significant improvement over preoperative Lysholm scores ($P < 0.0001$). None of the patients had pain and activity levels that necessitated total knee replacement at the end of final followup.

There was no statistically significant difference in the preoperative and postoperative IKDC ($P = 0.8015$) and Lysholm scores ($P = 0.5979$) between patients who had bone-patellar tendon-bone graft and hamstring graft [Figure 2]. There was no statistically significant difference between the preoperative and postoperative IKDC and Lysholm scores of patients with and without meniscal tear [Figure 3].

Preoperative radiographic evaluation showed Kellgren–Lawrence grades of osteoarthritis (OA) as follows – grade 0 (no changes of OA) in 10 patients, grade 1 (doubtful changes of OA) in 17 patients, grade 2 (minimal changes of OA) in 15 patients. Radiographic evaluation at final followup showed Kellgren–Lawrence grades as follows – grade 0 in 8 patients, grade 1 in 15 patients, grade 2 in 12 patients, and grade 3 (moderate changes of OA) in 7 patients. Overall, 14 out of 42 patients who underwent radiographic assessment showed progression of OA changes at the final followup after the intervention. However, none of the radiographs showed severe OA changes.

None of the patients required revision of the ACL reconstruction for graft failure. There were no serious

complications and no patients had deep vein thrombosis or pulmonary embolism. Three patients had superficial wound infection that cleared within a few days. Seven patients had knee stiffness lasting 2–3 months and the range of motion improved with physiotherapy. None of the patients had arthrofibrosis or deep infection.

DISCUSSION

The age limit for ACL reconstruction seems to steadily increasing and there have been two recent reports of successful ACL reconstruction in patients aged over 70 years.⁵ There seems to be agreement in the earlier literature regarding satisfactory clinical outcomes following ACL reconstruction in patients above the age of 40 years. Dahm *et al.*⁶ concluded that outcomes of ACL reconstruction in patients aged over 50 years are comparable to the outcomes in younger patients provided patients are selected carefully for the procedure. Patellar tendon autografts and allografts were used in their series. They did not find any increase in complications in the older group of patients. Similar good results have been reported by other authors.⁷⁻⁹ Studies that have compared outcomes of ACL reconstruction in patients younger and older than 40–50 years of age have demonstrated outcomes comparable in both the groups.¹⁰⁻¹³ Cartilage degeneration, although present to a greater degree in the older cohort, was not associated with a poorer outcome at intermediate followup. Khan *et al.* reported good outcomes following ACL reconstruction using 4-strand hamstring allografts in appropriately selected middle-aged patients.¹⁴

There seems to be a higher incidence of preoperative

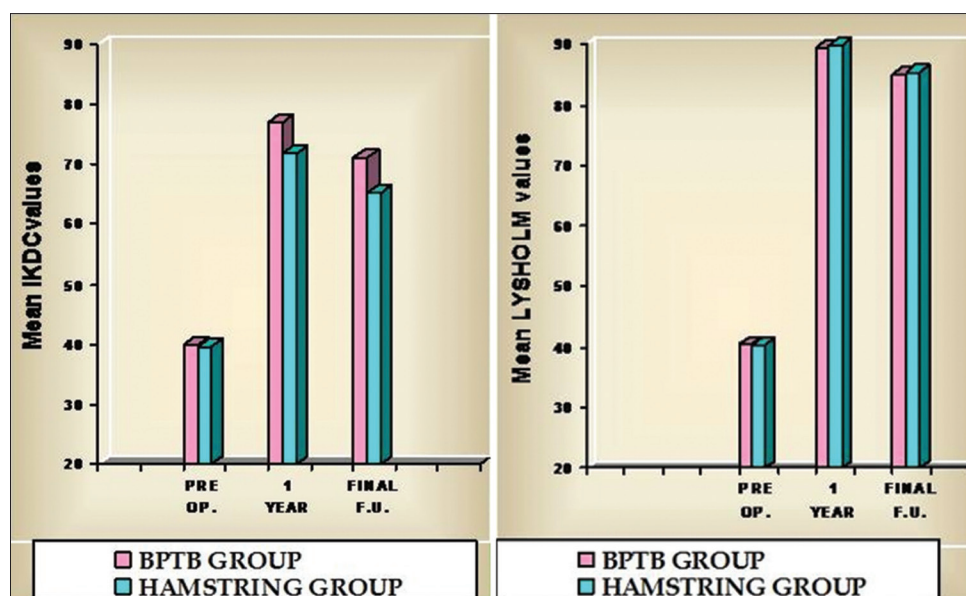


Figure 2: Bar diagram showing changes in IKDC and Lysholm scores in two different intervention groups (BPTB and hamstring graft)

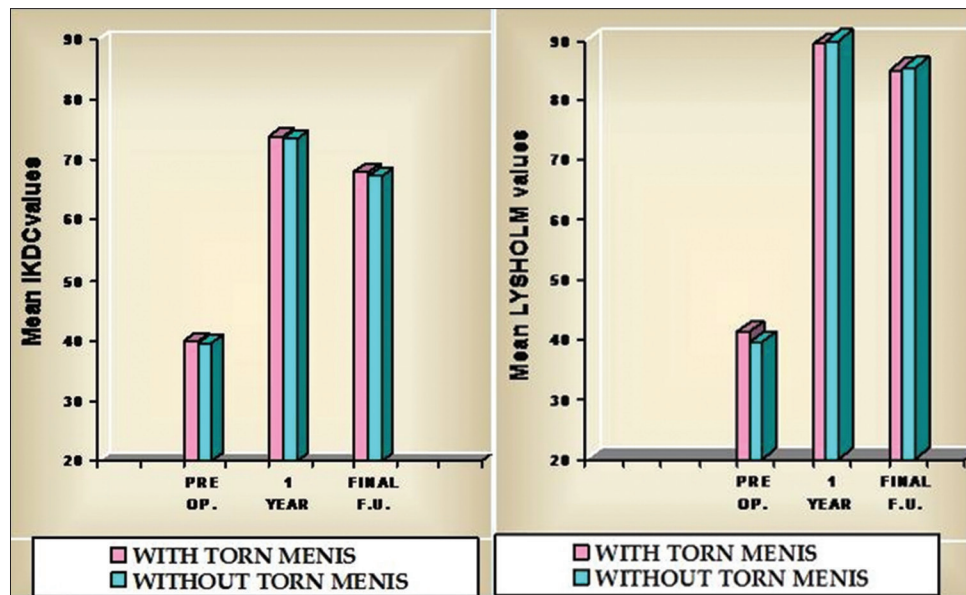


Figure 3: Bar diagram showing changes in IKDC and Lysholm scores in two different intervention groups (BPTB and hamstring graft) with or without meniscal injury

radiographic changes of joint degeneration in older patients undergoing ACL reconstruction. Postoperative radiographic changes may appear de novo or as progressions of preoperative changes. Radwan *et al.* found degenerative changes in the postoperative followup period in younger as well as older patients undergoing ACL reconstruction.¹⁵ There was a higher incidence of such changes in older patients (21.7% in older patients compared with 15.8% in younger patients). They reported that functional outcomes in patients with preoperative degenerative changes were inferior to the outcomes found in those without preoperative degenerative changes. High body mass index and delay in ACL reconstruction for more than 2 years following injury were associated with worse outcomes. In our series, 32 out of 42 patients (76%) had radiographic changes on preoperative radiographs. At the end of mean followup period of 46.2 months, 34 out of 42 patients (81%) had radiographic changes. Progression of radiographic degenerative changes was noted in 14 out of 42 patients at the end of mean followup period of 46.2 months (33%).

The choice of graft does not seem to influence the outcomes in patients older than 50 years. Comparable results have been reported with the use of bone patellar tendon grafts and hamstring grafts, autografts and allografts, single bundle and double bundle reconstructions.^{8,16} In the present study, both hamstring autograft (33 patients) as well as bone patellar tendon autograft (22 patients) were used. There were no statistically significant differences between the functional outcome scores and radiographic scores between the two types of grafts.

In this study, there was a statistically significant improvement in the IKDC and Lysholm scores following the intervention. Thus, the overall rate of satisfaction was high, and most of the patients were able to do their routine chores and light exercises suitable for their age group. We noticed a decrease in the scores at the final followup compared with the scores at the end of 1-year. However, the scores at final followup were still significantly better than the preoperative scores. None of the patients had symptoms severe enough to warrant total knee replacement. Followup studies of 10 years or more are likely to yield more accurate information in this regard.

Gee *et al.* also observed no significant differences in functional outcomes between young and old patients following reconstruction even though joint degenerative changes were seen more often in older patients.¹⁰ According to the study by Kim *et al.*, even symptomatic degenerative change in the knee may improve following ACL reconstruction.¹⁷ In their series, older patients who underwent ACL reconstruction reported significant improvement in activity related pain and instability whereas rest pain did not improve considerably. Patients with severe knee arthrosis on radiographs are probably not suitable for ACL reconstruction and suboptimal and poor outcomes were observed by Stein *et al.* in such patients following ACL reconstruction.¹⁸

In this series, 27 patients had associated meniscal injuries. Though there was no full thickness chondral damage in any of our patients, early focal chondral defects were observed in 7 patients (grade 1 and 2 changes on modified Outerbridge classification). However, the associated injuries

did not have statistically significant impact on the functional outcomes in the intermediate term. Blyth *et al.*¹⁹ reported significant association between secondary injuries and the outcomes whereas Dahm *et al.*⁶ found no such correlation between the two. The results of this series are in agreement with the observations of Dahm *et al.*⁶

CONCLUSION

Reconstruction of ACL tears in patients aged over 50 years is associated with favorable intermediate term outcomes in the majority of patients. There seems to be a slight deterioration of scores in some patients at the time of final followup after the intervention. Long term evaluations are worthwhile in this sub group of patients. The outcomes appear to be similar regardless of the type of graft used. Early degenerative changes on preoperative radiographs were not associated with poorer functional outcomes. Thus, chronological age and presence of early radiographic changes in the joint should not deter the surgeon from offering ACL reconstruction to older, active patients with symptomatic instability.

REFERENCES

1. Brown CA, McAdams TR, Harris AH, Maffulli N, Safran MR. ACL reconstruction in patients aged 40 years and older: A systematic review and introduction of a new methodology score for ACL studies. *Am J Sports Med* 2013;41:2181-90.
2. IKDC (International knee Documentation Committee). Available from: http://www.orthopaedicscore.com/scorepages/international_knee_documentation_comitee.html. [Last visited on 2014 Jul 30].
3. Briggs KK, Lysholm J, Tegner Y, Rodkey WG, Kocher MS, Steadman JR. The reliability, validity, and responsiveness of the Lysholm score and Tegner activity scale for anterior cruciate ligament injuries of the knee: 25 years later. *Am J Sports Med* 2009;37:890-7.
4. Kellgren JH, Lawrence JS. Radiological assessment of osteo-arthrosis. *Ann Rheum Dis* 1957;16:494-502.
5. Somayaji S, Jennings R, Harnett P, Dowd GS. Anterior cruciate ligament reconstruction in a 76-year-old patient. *Eur J Orthop Surg Traumatol* 2005;15:347-9.
6. Dahm DL, Wulf CA, Dajani KA, Dobbs RE, Levy BA, Stuart MA. Reconstruction of the anterior cruciate ligament in patients over 50 years. *J Bone Joint Surg Br* 2008;90:1446-50.
7. Plancher KD, Steadman JR, Briggs KK, Hutton KS. Reconstruction of the anterior cruciate ligament in patients who are at least forty years old. A long term followup and outcome study. *J Bone Joint Surg Am* 1998;80:184-97.
8. Ventura A, Legnani C, Terzaghi C, Borgo E. Single-and double-bundle anterior cruciate ligament reconstruction in patients aged over 50 years. *Arthroscopy* 2012;28:1702-9.
9. Arbuthnot JE, Brink RB. The role of anterior cruciate ligament reconstruction in the older patients, 55 years or above. *Knee Surg Sports Traumatol Arthrosc* 2010;18:73-8.
10. Gee AO, Kinsella S, Huffman GR, Sennett BJ, Tjoumakaris FP. Anterior cruciate ligament reconstruction in patients aged >40 years: A case-control study. *Phys Sports Med* 2013;41:30-4.
11. Osti L, Papalia R, Del Buono A, Leonardi F, Denaro V, Maffulli N. Surgery for ACL deficiency in patients over 50. *Knee Surg Sports Traumatol Arthrosc* 2011;19:412-7.
12. Marquass B, Hepp P, Engel T, Düsing T, Lill H, Josten C. The use of hamstrings in anterior cruciate ligament reconstruction in patients over 40 years. *Arch Orthop Trauma Surg* 2007;127:835-43.
13. Barber FA, Aziz-Jacobo J, Oro FB. Anterior cruciate ligament reconstruction using patellar tendon allograft: An age-dependent outcome evaluation. *Arthroscopy* 2010;26:488-93.
14. Khan RM, Prasad V, Gangone R, Kinmont JC. Anterior cruciate ligament reconstruction in patients over 40 years using hamstring autograft. *Knee Surg Sports Traumatol Arthrosc* 2010;18:68-72.
15. Radwan RY, Reda Mansour AM, Rizk A, Malak G. Anterior cruciate ligament reconstruction using hamstring autograft in over-40 patients. Does preoperative arthritic changes matter? *Eur Orthop Traumatol* 2014;5:253-60.
16. Struwer J, Ziring E, Oberkircher L, Schüttler KF, Efe T. Isolated anterior cruciate ligament reconstruction in patients aged fifty years: Comparison of hamstring graft versus bone-patellar tendon-bone graft. *Int Orthop* 2013;37:809-17.
17. Kim SJ, Park KH, Kim SH, Kim SG, Chun YM. Anterior cruciate ligament reconstruction improves activity-induced pain in comparison with pain at rest in middle-aged patients with significant cartilage degeneration. *Am J Sports Med* 2010;38:1343-8.
18. Stein DA, Brown H, Bartolozzi AR. Age and ACL reconstruction revisited. *Orthopedics* 2006;29:533-6.
19. Blyth MJ, Gosal HS, Peake WM, Bartlett RJ. Anterior cruciate ligament reconstruction in patients over the age of 50 years: 2-to 8-year followup. *Knee Surg Sports Traumatol Arthrosc* 2003;11:204-11.

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