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Original Research Article

Functional result of anterior cruciate ligament reconstruction by remnant preservation in a tertiary center in Eastern India

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ABSTRACT

Background: Anterior cruciate ligament (ACL) reconstruction is one of the most common procedures in orthopaedics. Orthopaedic surgery is vastly evolving to give better functional outcome. Apart from stability, proprioception, ligament healing are important factors for return to sports. The presence of remnant containing mechanoreceptors and free neural endings can help reinnervate the ACL auto graft. Aims and objectives were to evaluate clinical outcomes in patients undergoing ACL reconstruction with remnant preservation.
Methods: One hundred and six patients who underwent ACL reconstruction between April 2014 and March 2020. Among these 80 patients underwent remnant preservation. Analysis is done based on international knee documentation committee score (IKDC), modified Cincinnati knee rating system (MCKRS) and Tegner-Lysholm scoring system. Other factors are Lachman test, pivot shift test, return to sports and graft rupture rate.
Results: Lachman test became negative in 98% at 12 weeks and in all the patients at 24 months post-operatively. 74 patients (92.5%) among 80 patients develop full range of knee movement after ACL surgery. Post-operative scores are 95, 93, and 92 respectively.
Conclusions: Remnant preserving ACL reconstruction having excellent clinical outcome with good knee stability, early return to sports activities and no incidence of graft rupture in our series.

Keywords: ACL reconstruction, Remnant preservation, Excellent result

INTRODUCTION

Arthroscopic ACL reconstruction is a common procedure of orthopaedics. Techniques of ACL reconstruction has greatly evolved over the last decades. 89% Elite athletes can return to preinjury activity after surgery.[1] Current trends are to restore the native ACL anatomy and maintain its functional ability. Preserving the ACL remnant is one of efforts toward more anatomic and biologic reconstruction.[2]

Residual ACL remnants are commonly observed during arthroscopic examination. To identify the ACL attachment, the ACL remnant is debrided clearly during ACL reconstruction using standard techniques. In recent years, the importance of the ACL remnant has been recognized in terms of biomechanical, vascular, and proprioceptive function. Some studies reported that mechanoreceptors that control knee proprioception are located in the inner membrane of the synovium near the tibial attachment of the ACL.[3,4] In addition, the ACL remnant tissue has good sub-synovial and intra-fascicular vascularity.[3] This may accelerate cell repopulation and revascularization in the graft.

Theoretically, preserving ACL remnants have advantages of preserving proprioceptive mechanoreceptors, reducing synovial fluid leakage into bone tunnels, and improving knee stability. These advantages can result in excellent

graft reinnervation, ligamentization, remodelling, and better clinical outcomes.[5-8]

So, the objective of this study is to evaluate the functional results of remnant preservation ACL reconstruction.

METHODS

The study was done with 80 patients in KPC medical college and hospital after taking proper ethical committee clearance. The period of the study was from April 2014 to March 2019.

Study design

The study design used was prospective study.

Parameters used

Parameters used were-Sequential follow up with clinical examination and radiographic study and charting pain and range of motion of knee.

Study tools

Study tools used for this study were-Patient informed consent form, case sheets for relevant history and clinical examination, instruments like measuring tapes, goniometer and scoring systems like IKDC, MCKRS and Tegner-Lysholm scoring system.

All patients were operated by a single surgeon (first author). ACL reconstruction was done using quadrupled hamstring tendon autograft using trans portal technique.

Inclusion criteria

Physically active patient in the age group 18-40 years and isolated symptomatic ACL tear without any bony injury at insertion sites were included in the study.

Exclusion criteria

Patients had ACL injury along with other multifilament injury, ACL injury with meniscus injury and ACL injury with articular cartilage injury or osteoarthrosis of knee were excluded from the study.

Patients with a healthy contralateral knee and no histories of any previous knee injury were taken into consideration.

The remnants were classified as per the description of Craig et al. The femoral side was fixed using suspensory fixation (fixed loop endobutton) and the tibial side with interference screw. Accessory anteromedial portal was used to achieve an anatomical femoral tunnel. To establish the femoral bone tunnel, we carefully resect the necessary femoral fibres of the torn parts of the ACL to visualize the femoral insertion site. Then we create an adequate low anteromedial portal to establish the femoral bone tunnel. After using the 4.5 mm drill the final diameter of the femoral bone tunnel is usually established by dilatation for not to damage the intact ACL remnants by the head of a drill. Usually, the length of the femoral bone tunnel is between 32-40 mm. Consequently, we choose a 15 or 20 mm long endobutton for femoral fixation. On the tibial side the ACL stump is usually intact. Fixation on the tibial side is performed with a bioabsorbable screw

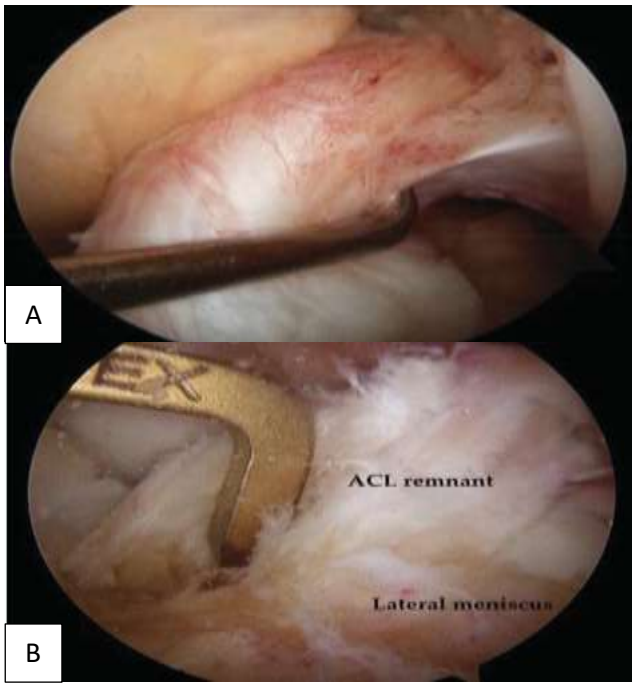

Figure 1: (A and B) ACL Remnant and tibial footprint through ACL remnant.

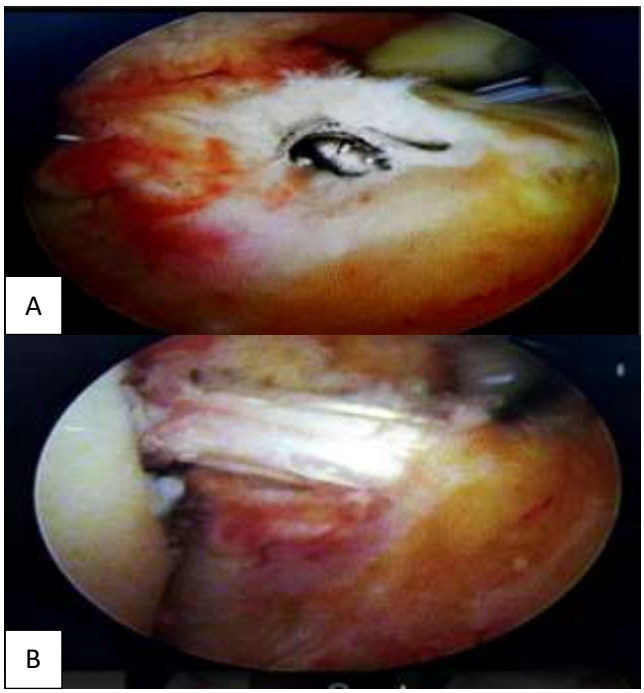

Figure 2: (A and B) Tibial tunnel preserving remnants and reconstructed ACL.

Figure 3: (A and B) Post-operative radiograph of ACL reconstruction AP and lateral view.

Postoperatively all patients were put on a long knee brace. Static quadriceps and ankle pump was started on day 0. Patient was allowed to walk with full weight bearing using crutches from day. Post operation. Sports like running and jogging was started at 2 months.

The analysis is done based on IKDC, MCKRS and Tegner-Lysholm scoring system.[9]

RESULTS

52 patients are between age group of 17-25 years. 17 patients between age group 26-35 years, >35 years patients are 11 in number.

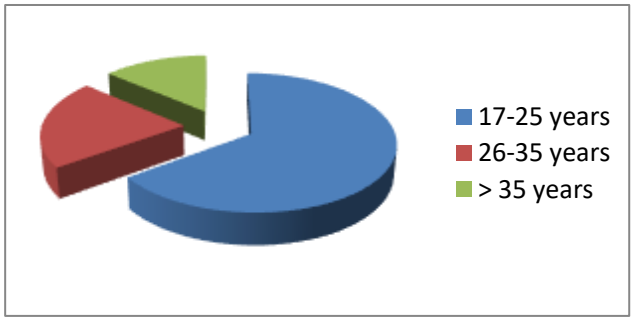

Figure 4: Age group.

In this study male patients were 57 in number and female are 23 in number.

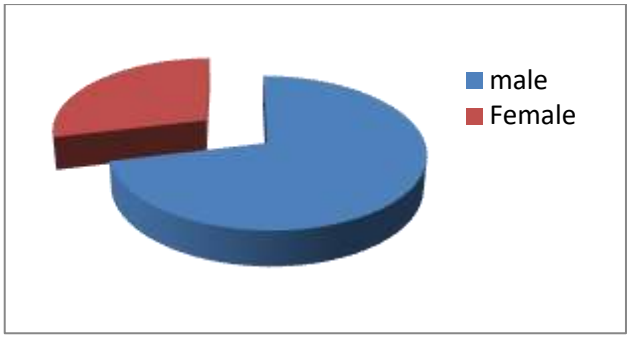

Figure 5: Sex distribution.

Analysis was done based on the pre- and post-operative scoring on subsequent follow-up for a duration of approximately 2 years (at 2 weeks, 6 weeks, 3 months, 6 months, 12 months, 18 months and 24 months post operatively).

Table 1: Pre-operative scores.

S. No.	Scoring system
1.	IKDC score
2.	MCKR system
3.	Tegner-Lysholm scoring system

The Lachman test was positive in all patients before ACL reconstruction and negative in 98% of them at 12 and negative in all the patients at 24 months post-operatively. 74 patients (92.5%) among 80 patients develop full range of knee movement after ACL surgery. Among 6 patients who did not gain full range of movement, 15^0 or less in flexion and 5^0 or less in extension was recorded in 5 (6.25%) patients and a significant restriction in extension exceeding 10^0 was found in one (1.25%) patient. None of the patients suffered any instability of the knee post primary surgery. None of the patients suffered any traumatic or non-traumatic re-tear and none required any revision surgery.[10,11]

Table 2: Post-operatively scores.

Scoring system	Post-operative
IKDC score	95
MCKR system	93
Tegner-Lysholm scoring system	92

Table 3: Overall pre- and post-operative outcome.

Scoring system	Pre-operatively	Post-operatively
IKDC score	35	95
MCKR system	29	93
Tegner-Lysholm scoring system	58	92

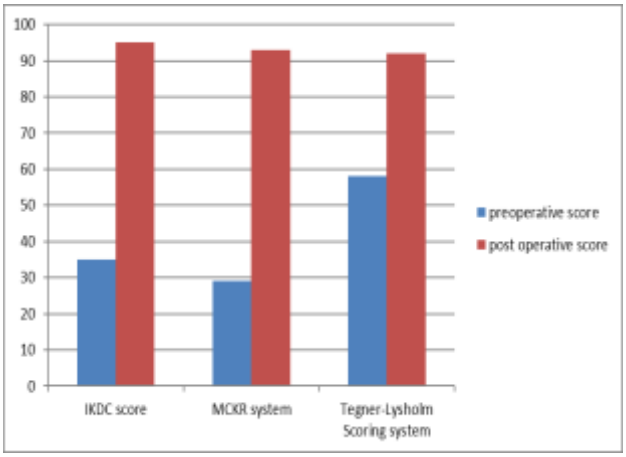

Figure 6:

DISCUSSION

Remnant preservation ACL reconstruction results in excellent post-operative knee scores, good knee stability and early return to sports but full extension was not achieved in 1.25% of patient. This is may be due to cyclops lesion, inadequate physiotherapy or both.

The remnant-preserving technique reduces the amount of bone tunnel enlargement following ACL R, so, this technique should be recommended.[5] Clinical scores were statistically significantly higher at 6 months postoperatively in the remnant preservation group.[12] Remnant preservation in hamstring auto graft ACL reconstruction may enhance tissue healing; however, retention of the remnant with its full volume resulted in an increased incidence of postoperative problematic extension loss.[6]

CONCLUSION

Preserving the ACL remnants helps in early healing of the graft, improves functional scores and stability of knee. It reduces the operative time and provides early return to activity, However, judicious preservation of amount of ACL fibres is required to prevent postoperative loss of extension and cyclops lesion.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Lai CCH, Ardern CL, Feller JA, Webster KE. Eighty-three per cent of elite athletes return to preinjury sport after anterior cruciate ligament reconstruction: A systematic review with meta-analysis of return to sport rates, graft rupture rates and performance outcomes. Br J Sports Med. 2018;52:128-38.
2. Takahashi T, Kondo E, Yasuda K. Effects of remnant tissue preservation on the tendon graft in anterior cruciate ligament reconstruction: A biomechanical and histological study. Am J Sports Med. 2016;44:1708-16.
3. Dhillon MS, Bali K, Vasistha RK. Immunohistological evaluation of proprioceptive potential of the residual stump of injured anterior cruciate ligaments (ACL). Int Orthop. 2010;34:737-41.
4. Bali K, Dhillon MS, Vasistha RK, Kakkar N, Chana R, Prabhakar S. Efficacy of immune-histological methods in detecting functionally viable mechanoreceptors in the remnant stumps of injured anterior cruciate ligaments and its clinical importance. Knee Surg Sports Traumatol Arthrosc. 2012;20:75-80.
5. Yanagisawa S, Kimura M, Hagiwara K, Ogoshi A, Nakagawa T, Shiozawa H et al. The remnant preservation technique reduces the amount of bone tunnel enlargement following anterior cruciate ligament reconstruction. Knee Surg Sports Traumatol Arthrosc. 2018;26(2):491-9.
6. Nakayama H, Kambara S, Iseki T, Kanto R, Kurosaka K, Yoshiya S. Double bundle anterior cruciate ligament reconstruction with and without remnant preservation-comparison of early postoperative outcomes and complications. Knee. 2017;24:1039-46.
7. Kondo E, Yasuda K, Onodera J, Kawaguchi Y, Kitamura N. Effects of remnant tissue preservation on clinical and arthroscopic results after anatomic double-bundle anterior cruciate ligament reconstruction. Am J Sports Med. 2015;43:1882-92.
8. Lee BI, Kwon SW, Kim JB, Choi HS, Min KD. Comparison of clinical results according to amount of preserved remnant in arthroscopic anterior cruciate ligament reconstruction using quadrupled hamstring graft. Arthroscopy. 2008;24:560-8.
9. Biau DJ, Tournoux C, Katsahian S, Schranz P, Nizard R. ACL Reconstruction. A Meta-analysis of Functional Scores. Clin Orthop Relat Res. 2007;458:180-7.
10. Shelbourne KD, Gray T, Haro M. Incidence of subsequent injury to either knee within 5 years after anterior cruciate ligament reconstruction with patellar tendon autograft. Am J Sports Med. 2009;37(2):246-51.
11. Salmon L, Russell V. Incidence and risk factors for graft rupture and contralateral rupture after anterior cruciate ligament reconstruction. Arthroscopy. 2005;21(8):948-57.
12. Chen T, Zhang P, Chen J, Hua Y, Chen S. Long-term outcomes of anterior cruciate ligament reconstruction using either synthetics with remnant preservation or hamstring autografts: a 10-year longitudinal study. Am J Sports Med. 2017;45(12):2739-50.

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