



COMPARISON BETWEEN SINGLE- AND DOUBLE-BUNDLE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION IN PEOPLE WITH ACL TEAR.

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ABSTRACT

Background: Double-bundle and single-bundle ACL reconstruction popularity is increasing with the aim to reproduce native ACL anatomy and improve ACL reconstruction outcome. **Aim:** The aim of this study was to prospectively compare the clinical results of single- and double-bundle ACL reconstruction. **Methods:** Twenty-two patients with a chronic unilateral ACL rupture who underwent arthroscopically assisted ACL reconstruction using a hamstring graft received a single- (SB) (n=10) or double-bundle (DB) (n=12) reconstruction. **Results:** Both groups were comparable with regard to preoperative data. All the patients reached a follow-up of one year. No differences between the 2 groups were observed in terms of Lysholm knee score and IKDC subjective score. **Conclusion:** In the one-year minimum follow-up, DB and SB ACL reconstructions showed comparable final objective IKDC scores and Lysholm score with time.

KEYWORDS : knee; ACL reconstruction; double-bundle technique; single-bundle technique

INTRODUCTION

The anterior cruciate ligament (ACL) is one of the most commonly injured ligaments of the knee in contact sports players. It accounts for about 200,000 injuries per year in the United States alone [1]. With the same activity level, females are four times more prone to ACL injuries than males [2]. There are various predisposing factors for ACL injury, which includes neuromuscular and biomechanical abnormalities, mutations within collagen producing genes like the COL5A1 and COL1A1 genes, female sex hormones, abnormal joint laxity [3], and primary structural influences of the knee [4-5]. Conservative management is useful in sedentary patients, but for other physically active patients, it is associated with a significant drawback when they can't resume high-level sports activities successfully [6]. Moreover, chronic ACL insufficiency may be associated with subsequent meniscal and articular cartilage injury and residual knee instability [7]. Hence, ACLR is now considered the treatment of choice in the majority of cases.

Double-bundle (DB) ACL reconstruction is increasing in popularity with the aim to reproduce native ACL anatomy and improve ACL reconstruction outcome. In particular, DB supporters aim at improving anterior and rotational knee stability and increasing knee function.

Chechik, et al. [8] noted that 68% of surgeons prefer the transportal technique while 31% prefer trans-tibial, and 1% prefer open method for femoral tunnel drilling worldwide. Thus, the transportal technique of femoral tunnel drilling seems to be a preferred method over trans-tibial technique as it gives better positioning of the femoral tunnel and good postoperative AP as well as rotational stability.

In this study, we compared a closer replication of ACL anatomy with a DB transportal technique with transportal single-bundle (SB) reconstruction.

Patients and Methods

Twenty-two patients with complete, isolated, and chronic ACL lesions (injury surgery interval >6 weeks) received an SB (n=10) or DB (n=12) ACL reconstruction with hamstring tendon graft. Inclusion criteria were closed physes and younger than 40 years old, healthy contralateral knee, no previous surgeries in the index knee (apart from partial meniscectomy), chondral lesions less than outer bridge grade

III, no patellofemoral symptoms, and absence of systemic illnesses. All the operated patients were followed-up for one year.

Surgical technique

All the procedures were performed with the use of a tourniquet. Complete ACL tear was confirmed at arthroscopy. The medial meniscus was torn in 5 knees in both groups. The lateral meniscus was torn in 2 knees in the SB group and in 3 in the DB group. Hamstring graft was harvested by reflecting the pes fascia using a 2-3 cm incision over antero medial aspect of the leg 2 cm from tibial tuberosity.

The grafts were either doubled or tripled depending upon the width of graft harvested. Minimum graft diameter was 8 mm and max was 10mm. Standard transportal method was used to create tibial and femoral tunnels. A shortening loop was used at the femoral end and a bioabsorbable screw was used to hold graft at the tibial end. Knee evaluation The International Knee Documentation Committee (IKDC Questionnaire) is a knee-specific patient-reported outcome measure. It's considered to be one of the most reliable outcome reporting tools in its category.

Evaluation of daily functional activities

The Lysholm knee score (Table 43-3), remains one of the most frequently used assessment tools for the results of ACL reconstruction even though it only measures activities of daily living (ADLs).

Statistical analysis

Data were presented as frequency, mean, median, standard deviation, and range. Quantitative variables between the groups were compared using Student t-test. P value <0.05 was considered significant. Statistical analysis was performed using SPSS v21.0.

Results

General characteristics

Table 1 shows general characteristics. Majority of the patients were males in both groups. In 17 patients, right side was involved. Median interval between injury and surgery was 13 and 15 days in SB and DB group respectively. Contact injury included football, rugby etc. Contact injury was the major cause of surgery (Table 1).

Knee flexibility

Pre-operatively, in both SB and DB group, Lachman test (++) was present in 9 and 10 patients respectively. None of the patients had Lachman test (+++).

Functional outcome

In both groups, there was a significant increase in IKDC group in both SB and DB groups. However, IKDC score in both groups was comparable at 3-months, 6-months, and one year (Table 2). Lysholm knee score showed that pre-operatively, all of the patients in both groups had fair to poor activities of daily living. The performance of activities increased with time, and at one year, all of the patients in both groups had excellent to good functioning (Table 2).

Complications

No complication was observed in any of the groups.

DISCUSSION

The main finding of this investigation is that, at one-year follow-up, transportal DB and SB ACL reconstruction had better final objective IKDC scores, and improved daily living activities.

Adachi et al. [8] found no differences between SB and DB reconstruction with a preliminary technique consisting of 1 tibial and 2 transtibial femoral tunnels. Jarvela [9] after 1 year, reported superior stability results in both translational and rotational in a DB group with a transportal technique.

Streich et al. [10] and Siebold et al. [11] used a transtibial technique both for SB and DB reconstructions and found no advantages in using a DB technique. With the same approach, Kondo et al. [12] in a comparative study, evaluated 328 consecutive patients and observed improved anterior stability and less pivot shift after DB compared with SB reconstruction.

In conclusion, both single bundle and double bundle provide favorable outcomes with neither of them superior to another in our study.

Table 1: General characteristics

	Single bundle (n=10)	Double bundle (n=12)
Age (years)	25.12±10.13	24.73±9.61
Sex, Male:Female	8:2	9:1
Side involved, Right	9	8
Body weight (Kg)	64.36±12.91	67.43±11.65
Height (cm)	159.25±10.33	161.04±10.51
Type of injury	7	8
Contact	3	4
Noncontact		
Interval between injury and surgery (days), median [range]	13 [1-43]	15 [2-40]

Table 2: Functional outcome

	Pre-operative		3-months		6-months		12-months	
	SB	DB	SB	DB	SB	DB	SB	DB
IKDC score	41 ± 13	44 ± 15	72 ± 15	74 ± 16	76 ± 12	78 ± 15	81 ± 13	83 ± 15
Lysholm knee score								
Excellent	0	0	0	0	2	1	9	11
Good	0	0	3	1	7	9	1	1
Fair	1	3	6	9	1	2	0	0
Poor	9	9	1	2	0	0	0	0

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