

Comparison of Graft Type and Fixation Method in Anterior Cruciate Ligament Reconstruction: A Systemic Review and Meta-analysis Based on Randomized Control Studies

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DISCLOSURES: Ryan Jones(N), Jiayong Liu (N)

INTRODUCTION: The anterior cruciate ligament (ACL) is the most commonly injured ligament in the knee. There are between 100,000 and 200,000 ACL ruptures per year, with an annual incidence in the general population of approximately 1 in 3500 [1-3]. ACL reconstruction (ACLR) proves the standard for treating this injury. However, graft choice and method of fixation remain a heavily debated topic. While many ACL reconstruction-related meta-analyses have been published within the last five years, few included a comprehensive comparison of outcomes of multiple treatment methods including graft type as well as fixation method. This study investigates the following: bone-patellar tendon-bone (BPTB) vs hamstring tendon autograft, single bundle (SB) vs double bundle (DB) hamstring graft, and metal vs bioabsorbable screws in ACLR.

METHODS: A systematic review was performed on PubMed and Google Scholar according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [4]. Data was collected on patient demographics, complications, and functionality scores including IKDC and Lysholm scores. A systemic review and meta-analysis were conducted with the Review Manager. Outcome measurements were determined using forest plots with significant differences considered $p < 0.05$.

RESULTS: Twenty-five studies were included, accounting for 2,170 patients (See Figure 1). No statistically significant difference was appreciated when comparing BPTB to hamstring autografts (See Table 1). Patients who received a DB hamstring tendon autograft exhibited significantly superior outcomes in terms of revision ($p=0.05$), failure ($p=0.002$), normal pivot shift tests ($p=0.04$), and normal IKDC ($p=0.008$) (See Table 2). When comparing screw types, bioabsorbable screws had a greater Lysholm score ($p=0.01$) and lower failure rates for Copolymer screws ($p=0.03$) (See Table 3).

DISCUSSION: Overall, the data collected suggested that BPTB and hamstring tendon autografts display similar post-operative results. However, if a hamstring tendon autograft is used, the data suggests a DB graft improves both functionality and decreases the possible complications. Finally, bioabsorbable screws prove superior to metal screws when looking at both functionality as well as failure rates. Further research into the superior graft type is still needed..

CLINICAL RELEVANCE: When determining surgical repair for an ACLR, numerous graft types as well as fixation methods are available for use. While graft type and fixation method is heavily researched there does not appear to be a clear superior method for choosing both graft type and fixation. This paper may aid in the decision-making process for orthopedic surgeons when determining the surgical approach for ACLR.

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FIGURES/TABLES

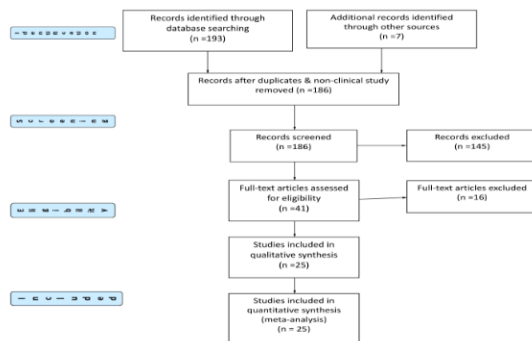


Figure 1 PRISMA inclusion-exclusion flow chart

Study	Odds Ratio IV, Random, 95% CI	Favours	P-Value
Revisions	4.13 [0.99, 17.13]	DB	0.05
Failure	4.79 [1.77, 12.93]	DB	0.002
Pivot Shift Normal	0.35 [0.13, 0.95]	DB	0.04
Pivot Shift Abnormal	1.27 [0.30, 5.39]		0.75
IKCD Normal	0.59 [0.40, 0.87]	DB	0.008
Mean Difference IV, Random, 95% CI			
KT-1000	0.57 [-0.04, 1.18]		0.07
Lysholm	0.69 [-1.35, 2.73]		0.51

Table 1 Statistical Comparison of SB vs DB Hamstring autograft

Study	Odds Ratio IV, Random, 95% CI	Favours	P-Value
Revisions	0.40 [0.14, 1.12]		0.08
Failure - Copolymer Screw	0.34 [0.13, 0.88]	Bioabsorbable	0.03
Failure - PLLA Screw	1.63 [0.19, 13.62]		0.65
Infection	2.35 [0.50, 11.18]		0.28
Other Complications	0.72 [0.35, 1.48]		0.38
Pivot Shift Normal	0.91 [0.44, 1.90]		0.80
Pivot Shift Abnormal	1.28 [0.75, 2.19]		0.37
Lachman Normal	1.66 [0.68, 4.07]		0.27
Lachman Abnormal	1.19 [0.65, 2.21]		0.57
IKCD Normal	1.01 [0.56, 1.82]		0.97
Mean Difference IV, Random, 95% CI			
KT-1000	0.12 [-0.22, 0.46]		0.49
Lysholm	-1.47 [-2.64, -0.30]	Bioabsorbable	0.01
Lysholm - Copolymer Screw	-3.30 [-6.06, -0.53]	Bioabsorbable	0.02
Lysholm - PLLA Screw	-1.77 [-3.38, -0.17]	Bioabsorbable	0.03
Lysholm - Polyglyconate Screw	-1.47 [-2.64, -0.30]	Bioabsorbable	0.01

Table 2 Statistical Comparison of Metal vs Bioabsorbable Screws