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Original Research Article

Comparative Analysis of the Functional Outcome of Arthroscopic Anterior Cruciate Ligament Reconstruction Using Quadrupled Hamstring Graft Fixed with Bioabsorbable Interference Screw Against Titanium Interference Screw

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ABSTRACT

Background: The choice of tibial fixation device remains an important consideration in anterior cruciate ligament (ACL) reconstruction using hamstring autografts. Bioabsorbable interference screws offer potential advantages over titanium screws, although comparative clinical outcomes remain of interest. This study compared the functional and clinical outcomes of arthroscopic ACL reconstruction using a quadrupled hamstring autograft with bioabsorbable versus titanium interference screw fixation.
Methods: This prospective comparative study was conducted in the Department of Orthopaedic Surgery, Balrampur Hospital, Lucknow, over a one-year period. Fifty patients aged 18–45 years undergoing primary arthroscopic single-bundle ACL reconstruction were included and divided equally into bioabsorbable screw (n=25) and titanium screw (n=25) groups. All patients underwent quadrupled semitendinosus and gracilis hamstring autograft reconstruction with Endobutton femoral fixation and the allocated tibial interference screw. Patients were evaluated preoperatively and at 6 weeks, 12 weeks, and 6 months using the Lysholm knee score, range of motion, anterior drawer and Lachman tests, pivot shift test, extension lag, and quadriceps strength.
Results: Baseline demographic and clinical characteristics were comparable between the groups ($p>0.05$). Lysholm knee scores improved progressively in both groups, with good or excellent scores at 6 months in 84.0% of patients in the bioabsorbable group and 80.0% in the titanium group. Knee laxity, pivot shift positivity, range of motion, extension lag, and quadriceps weakness also improved significantly during follow-up in both groups ($p<0.05$). At 6 months, the overall outcome was good in 84.0% of patients in the bioabsorbable group and

88.0% in the titanium group, with no poor outcomes and no statistically significant difference between groups (p=0.6836).
Conclusion: Arthroscopic ACL reconstruction using a quadrupled hamstring autograft demonstrated substantial short-term improvement in functional and clinical outcomes with both bioabsorbable and titanium interference screw fixation. No statistically significant difference in overall functional outcome was observed between the two fixation groups at 6 months. Bioabsorbable interference screws may therefore represent a clinically viable alternative to titanium screws for tibial fixation in primary ACL reconstruction.

Keywords: *Anterior cruciate ligament reconstruction, bioabsorbable interference screw, titanium interference screw, quadrupled hamstring graft, Lysholm knee score*

INTRODUCTION

The anterior cruciate ligament (ACL) is a robust collagenous structure extending from the anteromedial intercondylar area of the tibia to the medial aspect of the lateral femoral condyle. Together with the posterior cruciate ligament, it restrains excessive anteroposterior translation of the tibia and contributes to rotational stability of the knee. The ACL is the most commonly injured ligament of the knee, with an annual incidence of approximately 1 in 3500 individuals in the United States, and the majority of injuries in athletes occur through non-contact rotational mechanisms.[1] Several factors, including relative hamstring weakness, dynamic knee valgus during landing and cutting, and possible hormonal influences on ligament laxity, have been proposed to explain the higher susceptibility of female athletes to ACL injury.[2] Although the diagnosis can be made clinically, magnetic resonance imaging is frequently used for confirmation, with a reported sensitivity of 86% and specificity of 95%.[3]
Arthroscopic intra-articular reconstruction has attained gold standard status in the management of ACL insufficiency; nevertheless, questions persist regarding graft selection, single- versus double-bundle technique, transportal versus transtibial tunnel placement, and above all the method of graft fixation.[4] The quadrupled hamstring autograft offers high tensile strength with low donor-site morbidity, and suspensory devices such as the endobutton provide reliable femoral fixation. On the tibial side, interference screws provide direct juxta-articular fixation. Bioabsorbable implants were introduced into orthopaedic surgery by Rokkanen et al. for ankle fracture fixation,[5] and interference screw fixation has since become established for both bone and soft tissue grafts.[6] Titanium screws are durable and time-tested but may lacerate the graft, generate artefact on magnetic resonance imaging, and complicate revision surgery, whereas bioabsorbable screws avoid these drawbacks at the cost of concerns regarding breakage, tunnel widening, and inflammatory reactions.[7,8]
Randomized trials and systematic reviews comparing bioabsorbable and metallic interference screws have generally reported comparable clinical results, but data from Indian tertiary care settings remain limited.[7,9] The present study was therefore undertaken to compare the functional outcome of arthroscopic ACL reconstruction using a quadrupled hamstring graft fixed with a bioabsorbable interference screw against a titanium interference screw.

MATERIALS AND METHODS

This prospective comparative study was conducted in the Department of Orthopaedic Surgery, Balrampur Hospital, Lucknow, over a period of one year. Patients admitted with ACL injuries and available for follow-up were screened, and a total of 50 patients fulfilling the inclusion criteria and providing written informed consent were enrolled after ethical clearance. Patients were distributed equally into two groups according to the tibial fixation device used: the bioabsorbable interference screw group (n=25) and the titanium interference screw group (n=25). In both groups, femoral fixation was achieved with an endobutton.

Inclusion criteria were active, motivated patients aged 18-45 years with a closed growth plate undergoing primary ACL surgery, without multiligamentous injury, previous knee surgery, or ligamentous injury of the contralateral knee. Exclusion criteria were additional ligamentous laxity of the affected knee, previous ACL surgery of either knee, chronic muscle disorders, and coexisting local conditions such as active articular infection, inflammatory joint disease, metabolic bone disease, or neoplastic disease.

All patients underwent routine preoperative evaluation and were operated under spinal anaesthesia in the supine position with a pneumatic thigh tourniquet. Examination under anaesthesia included the anterior drawer, posterior drawer, Lachman, and pivot shift tests. Diagnostic arthroscopy was performed through standard anterolateral and anteromedial portals, and unstable meniscal tears were treated with partial meniscectomy or debridement as required. The semitendinosus and gracilis tendons were harvested through an oblique anteromedial incision over the pes anserinus and prepared as a quadrupled graft. The tibial tunnel was created with a tibial jig set at 55 degrees within the native ACL footprint, and the femoral tunnel was created by the transportal technique using a 7 mm offset aimer positioned to preserve at least 2 mm of posterior cortex. The graft was passed and femoral fixation was achieved by flipping the endobutton over the lateral femoral cortex, after which the graft was tensioned through a full range of motion and tibial fixation was performed with the allocated bioabsorbable or titanium interference screw.

Postoperatively, the limb was immobilized in an extension knee brace with limb elevation, and a standard graduated rehabilitation protocol was followed, progressing from static quadriceps exercises and protected weight bearing to full range of motion by six weeks, closed chain strengthening, and jogging and agility training after twelve weeks. Patients were followed up at 6 weeks, 12 weeks, and 6 months. Functional status was assessed with the Lysholm knee score (<60 poor, 61-76 fair, 77-90 good, ≥91 excellent), knee laxity with the anterior drawer, Lachman, and pivot shift tests, and motor recovery with knee range of motion, extension lag (≥5 degrees), and quadriceps strength measured with a spring balance. The overall outcome at final follow-up was graded as good, fair, or poor.

Statistical Analysis

Statistical analysis was performed using SPSS version 26.0 (SPSS Inc., Chicago, IL, USA). Values were expressed as number (%) and mean ± standard deviation. Categorical variables were compared using the Chi-square test or Fisher's exact test as applicable and means were compared using Student's t-test. A p-value of <0.05 was regarded as statistically significant.

RESULT

The two groups were comparable with respect to baseline characteristics [Table 1]. The majority of patients in both the bioabsorbable and titanium groups were aged 21-30 years (64.00% and 68.00%, respectively; p=0.7329). Males slightly outnumbered females overall, without a significant difference in gender distribution (p=0.5713). The right side was more commonly involved in both groups (56.00% and 60.00%; p=0.7745), and road traffic accidents were the leading mode of injury (72.00% and 80.00%; p=0.7597). Most patients presented within two weeks of injury (88.00% and 84.00%; p=0.8944). Isolated ACL injury was the most common pattern in the bioabsorbable group (48.00%), while an associated meniscus tear was most common in the titanium group (44.00%); associated posterior cruciate ligament injury was the least frequent in both groups (p=0.8302).

Table 1: Baseline characteristics of the enrolled patients in the bioabsorbable and titanium screw groups.

Variable	Category	Bioabsorbable screw (n=25)	Titanium screw (n=25)	p-value
Age (years)	<20	4 (16.00%)	5 (20.00%)	0.7329
	21-30	16 (64.00%)	17 (68.00%)	
	31-40	4 (16.00%)	3 (12.00%)	
	41-45	1 (4.00%)	0 (0.00%)	
Gender	Male	12 (48.00%)	14 (56.00%)	0.5713
	Female	13 (52.00%)	11 (44.00%)	
Side of injury	Right	14 (56.00%)	15 (60.00%)	0.7745
	Left	11 (44.00%)	10 (40.00%)	
Mode of injury	Road traffic accident	18 (72.00%)	20 (80.00%)	0.7597
	Sports	5 (20.00%)	4 (16.00%)	
	Fall	2 (8.00%)	1 (4.00%)	
Duration of injury	<2 weeks	22 (88.00%)	21 (84.00%)	0.8944
	2-4 weeks	2 (8.00%)	3 (12.00%)	
	4-8 weeks	1 (4.00%)	1 (4.00%)	
Associated injury	Meniscus tear	10 (40.00%)	11 (44.00%)	0.8302
	PCL injury	3 (12.00%)	4 (16.00%)	
	Isolated ACL	12 (48.00%)	10 (40.00%)	

Range of motion improved progressively in both groups after surgery [Table 2]. Preoperatively, most knees were restricted to 0-100 degrees, whereas by 6 months the majority of patients in both groups achieved flexion beyond 110 degrees, including 0-130 degrees in 16.00% of the bioabsorbable group and 20.00% of the titanium group and 0-140 degrees in 8.00% of the titanium group. The improvement from the preoperative range was statistically significant at 6 months in both groups (p<0.0001), with no significant intergroup difference.

Table 2: Range of motion before and after surgery in the bioabsorbable and titanium screw groups.

Range of motion	Bioabsorbable screw (n=25)				Titanium screw (n=25)			
	Pre-op	6 wk	12 wk	6 mo	Pre-op	6 wk	12 wk	6 mo
0-80°	3 (12%)	0	0	0	2 (8%)	1 (4%)	0	0
0-90°	10 (40%)	6 (24%)	4 (16%)	0	12 (48%)	10 (40%)	5 (20%)	0
0-100°	11 (44%)	7 (28%)	5 (20%)	4 (16%)	9 (36%)	12 (48%)	9 (36%)	1 (4%)
0-110°	1 (4%)	11 (44%)	9 (36%)	6 (24%)	2 (8%)	1 (4%)	10 (40%)	2 (8%)
0-120°	0	1 (4%)	6 (24%)	11 (44%)	0	1 (4%)	1 (4%)	13 (52%)
0-130°	0	0	1 (4%)	4 (16%)	0	0	0	5 (20%)
0-140°	0	0	0	0	0	0	0	2 (8%)
p-value (vs pre-op)	–	0.0066*	0.0007*	<0.0001*	–	0.6849	0.0242*	<0.0001*

Lysholm knee scores improved significantly in both groups [Table 3]. Preoperatively, most patients were in the fair category (60.00% and 64.00%) and none were excellent. By 6 months, 48.00% of the bioabsorbable group had good and 36.00% excellent scores, while 52.00% of the titanium group had good and 28.00% excellent scores. The improvement compared with the preoperative score was significant at 12 weeks (p=0.0135 and p=0.0092) and 6 months (p<0.0001 and p=0.0004) in the bioabsorbable and titanium groups, respectively, with a non-significant intergroup comparison.

Table 3: Lysholm knee score categories before and after surgery in the bioabsorbable and titanium screw groups.

Lysholm knee score	Bioabsorbable screw (n=25)				Titanium screw (n=25)			
	Pre-op	6 wk	12 wk	6 mo	Pre-op	6 wk	12 wk	6 mo
Poor (<60)	4 (16%)	2 (8%)	0	0	3 (12%)	2 (8%)	0	0
Fair (61-76)	15 (60%)	14 (56%)	9 (36%)	4 (16%)	16 (64%)	15 (60%)	8 (32%)	5 (20%)
Good (77-90)	6 (24%)	8 (32%)	14 (56%)	12 (48%)	6 (24%)	7 (28%)	15 (60%)	13 (52%)
Excellent (≥91)	0	1 (4%)	2 (8%)	9 (36%)	0	1 (4%)	2 (8%)	7 (28%)
p-value (vs pre-op)	–	0.5751	0.0135*	<0.0001*	–	0.7270	0.0092*	0.0004*

Anteroposterior laxity assessed by the anterior drawer and Lachman tests improved markedly [Table 4]. Preoperatively, grade IV laxity predominated in both groups (60.00% and 64.00%). At 6 months, 52.00% of the bioabsorbable group and 48.00% of the titanium group had no demonstrable laxity, and no patient retained grade III or IV laxity; the improvement was highly significant at 12 weeks and 6 months in both groups (p<0.0001).

Table 4: Anterior drawer and Lachman test grades before and after surgery in the bioabsorbable and titanium screw groups.

Laxity grade	Bioabsorbable screw (n=25)				Titanium screw (n=25)			
	Pre-op	6 wk	12 wk	6 mo	Pre-op	6 wk	12 wk	6 mo
No laxity	0	0	2 (8%)	13 (52%)	0	0	3 (12%)	12 (48%)
Grade I	0	1 (4%)	6 (24%)	9 (36%)	0	0	6 (24%)	11 (44%)
Grade II	3 (12%)	4 (16%)	8 (32%)	3 (12%)	1 (4%)	5 (20%)	9 (36%)	2 (8%)
Grade III	7 (28%)	9 (36%)	9 (36%)	0	8 (32%)	8 (32%)	7 (28%)	0
Grade IV	15 (60%)	11 (44%)	0	0	16 (64%)	12 (48%)	0	0
p-value (vs pre-op)	–	0.5707	<0.0001*	<0.0001*	–	0.1981	<0.0001*	<0.0001*

The pivot shift test was positive preoperatively in 84.00% of the bioabsorbable group and 88.00% of the titanium group [Table 5]. At 6 months, it remained positive in only 20.00% and 24.00%, respectively, with significant improvement at 12 weeks (p=0.0032 and p=0.0004) and 6 months (p<0.0001 in both groups).

Table 5: Pivot shift test results before and after surgery in the bioabsorbable and titanium screw groups.

Pivot shift test	Bioabsorbable screw (n=25)				Titanium screw (n=25)			
	Pre-op	6 wk	12 wk	6 mo	Pre-op	6 wk	12 wk	6 mo
Positive	21 (84%)	18 (72%)	11 (44%)	5 (20%)	22 (88%)	19 (76%)	10 (40%)	6 (24%)
Negative	4 (16%)	7 (28%)	14 (56%)	20 (80%)	3 (12%)	6 (24%)	15 (60%)	19 (76%)
p-value (vs pre-op)	–	0.3057	0.0032*	<0.0001*	–	0.2695	0.0004*	<0.0001*

Knee extension lag also improved after surgery, with the majority of patients in both groups demonstrating no extension lag (<5 degrees) at final follow-up, and the improvement over the preoperative status was statistically significant (p<0.001). Quadriceps muscle weakness, present in 100.00% of the bioabsorbable group and

96.00% of the titanium group preoperatively, persisted in only 16.00% and 20.00% at 6 months, respectively [Table 6], with significant improvement at every follow-up (p<0.05).

Table 6: Quadriceps muscle weakness before and after surgery in the bioabsorbable and titanium screw groups.

Quadriceps weakness	Bioabsorbable screw (n=25)				Titanium screw (n=25)			
	Pre-op	6 wk	12 wk	6 mo	Pre-op	6 wk	12 wk	6 mo
Present	25 (100%)	18 (72%)	11 (44%)	4 (16%)	24 (96%)	17 (68%)	12 (48%)	5 (20%)
Absent	0	7 (28%)	14 (56%)	21 (84%)	1 (4%)	8 (32%)	13 (52%)	20 (80%)
p-value (vs pre-op)	–	0.0043*	<0.0001*	<0.0001*	–	0.0100*	0.0020*	<0.0001*

At final follow-up, the overall outcome was good in 84.00% of the bioabsorbable group and 88.00% of the titanium group, fair in 16.00% and 12.00%, respectively, and poor in none [Table 7]. There was no statistically significant difference in the overall outcome between the two groups (p=0.6836).

Table 7: Overall outcome at final follow-up in the bioabsorbable and titanium screw groups.

Overall outcome	Bioabsorbable screw (n=25)	Titanium screw (n=25)	p-value
Good	21 (84.00%)	22 (88.00%)	0.6836
Fair	4 (16.00%)	3 (12.00%)	
Poor	0 (0.00%)	0 (0.00%)	

DISCUSSION

In the present study of 50 patients, the majority in both groups were aged 21-30 years, and no significant differences were found between the groups for any baseline variable, indicating well-matched cohorts. Khadka T et al. reported mean ages of 29.15 ± 11.6 years in the titanium group and 28.90 ± 9.03 years in the bioabsorbable group in a similar two-group comparison,[10] and Jajee N et al. likewise observed that most patients were aged 21-30 years (46.66%) with a marked male preponderance (90.00%).[11] Parvez M et al. reported a mean age of 24.5 ± 3.3 years with male predominance,[12] and Sundaraj K et al. and Vinoth and Reddy reported comparable demographic profiles in their randomized and prospective comparisons of the same two fixation devices.[13,14] We noted a slight female preponderance in the bioabsorbable group (52.00%), which may reflect regional and referral patterns; Sharma P et al. similarly documented a mean age of 31.1 ± 8.8 years with male preponderance in an Indian cohort.[15]

Right-sided involvement predominated in both of our groups (56.00% and 60.00%), and road traffic accidents were the leading mode of injury (72.00% and 80.00%), followed by sports injuries and falls. Vinoth and Reddy similarly reported right-sided predominance with road traffic accidents and falls accounting for 77% and 17% of injuries,[14] and Jajee N et al. and Khadka T et al. also found road traffic accidents and right-sided injuries to be most frequent. [10,11] By contrast, Kumar BR et al. and Chaudhary D et al. reported sports injuries as the dominant mechanism in their series, [16,17] which likely reflects differences in the populations studied. Regarding associated injuries, 40.00-44.00% of our patients had meniscal tears, consistent with Lewis DW et al., who found a 58% incidence of meniscal injury at the time of ACL reconstruction,[18] and with Lyman S et al., who reported that more than half of ACL reconstructions were accompanied by meniscal procedures.[19]

Both fixation devices produced substantial functional gains. Lysholm scores shifted from predominantly poor and fair categories preoperatively to good and excellent categories at 6 months in both groups, in agreement with Khatri NP et al., who recorded significant postoperative improvement in Lysholm scores ($p<0.001$).[20] Khadka T et al. found no statistical difference between titanium and bioabsorbable screws, with mean Lysholm scores at 12 months of 85.90 and 84.65, respectively,[10] and Sundaraj K et al. reported excellent postoperative scores with no intergroup difference over 13 years of follow-up.[13] Pooled analyses have similarly found no difference in Lysholm scores or range-of-motion deficits between bioabsorbable and metallic screws irrespective of follow-up duration.[21-24]

Knee stability improved markedly in both groups: at 6 months no patient retained grade III or IV anteroposterior laxity, and the pivot shift test became negative in 80.00% of the bioabsorbable group and 76.00% of the titanium group. Jajee N et al. observed the same transition from predominantly grade IV laxity preoperatively to no laxity or grade I laxity after surgery in both device groups,[11] and the meta-analysis by Xu B et al. found no significant difference between bioabsorbable and metallic screws in the rates of positive Lachman (RR 0.82; 95% CI 0.48-1.39) or pivot shift tests (RR 0.87; 95% CI 0.61-1.24).[24] Parvez M et al. and Kumar BR et al. also documented restoration of stability in almost all patients by final follow-up.[12,16]

Residual quadriceps weakness declined from nearly universal preoperative prevalence to 16.00-20.00% at 6 months in our study, mirroring the recognized trajectory of quadriceps recovery after ACL reconstruction, and extension lag resolved in the majority of patients, comparable to Fox JA et al., who reported a residual extensor lag in only 10% of patients.[25]

The overall outcome was good in 84.00% of the bioabsorbable group and 88.00% of the titanium group with no poor outcomes and no significant intergroup difference ($p=0.6836$). This accords with Vinoth and Reddy, who reported good results in 80.00% and 86.67% of their bioabsorbable and titanium groups, respectively,[14] with Khadka T et al. and Sundaraj K et al., who found no difference in functional outcomes between the two devices,[10,13] and with the multicentre randomized comparison by Kaeding C et al., which demonstrated equivalent results at 1 and 2 years.[26] Taken together with the meta-analytic evidence,[24] these findings indicate that the choice between bioabsorbable and titanium interference screws does not materially influence short- to medium-term functional outcome, and that surgical technique, tunnel placement, graft tensioning, and rehabilitation are the principal determinants of success.

CONCLUSION

This study found no discernible difference in functional outcome between bioabsorbable and titanium interference screws for tibial fixation in arthroscopic ACL reconstruction with a quadrupled hamstring graft and endobutton femoral fixation. Both groups achieved significant improvements in Lysholm scores, knee stability, range of motion, extension lag, and quadriceps strength, with good overall outcomes in 84.00% and 88.00% of patients, respectively, and no poor outcomes. The success of ACL reconstruction appears contingent on accurate surgical technique, precise graft placement, and effective rehabilitation rather than the specific fixation device employed. Given that bioabsorbable screws avoid certain drawbacks of metallic implants, they may be considered a comparable and increasingly attractive alternative in ACL reconstruction. The study is limited by its single-centre setting, small sample size, partly retrospective enrolment, and short follow-up of six months; larger prospective studies with longer follow-up, including assessment of tunnel widening, screw resorption, and patient-reported outcomes, are warranted.

Declaration

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REFERENCES

1. Evans J, Mabrouk A, Nielson Jl. Anterior Cruciate Ligament Knee Injury. [Updated 2023 Nov 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK499848/
2. Hewett TE, Myer GD, Ford KR, Heidt RS, Colosimo AJ, McLean SG, et al. Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury risk in female athletes: a prospective study. Am J Sports Med. 2005;33(4):492-501. doi: 10.1177/0363546504269591.
3. Filbay SR, Grindem H. Evidence-based recommendations for the management of anterior cruciate ligament (ACL) rupture. Best Pract Res Clin Rheumatol. 2019;33(1):33-47. doi: 10.1016/j.berh.2019.01.018.
4. Kousa P, Järvinen TL, Vihavainen M, Kannus P, Järvinen M. The fixation strength of six hamstring tendon graft fixation devices in anterior cruciate ligament reconstruction: part I: femoral site. Am J Sports Med. 2003;31(2):174-81. doi: 10.1177/03635465030310020401.
5. Rokkanen P, Bostman O, Vainionpaa S, Vihtonen K, Tormala P, Laiho J, et al. Biodegradable implants in fracture fixation: early results of treatment of fractures of the ankle. Lancet. 1985;1(8443):1422-4. doi: 10.1016/s0140-6736(85)91847-1.
6. Scheffler SU, Südkamp NP, Göckenjan A, Hoffmann RF, Weiler A. Biomechanical comparison of hamstring and patellar tendon graft anterior cruciate ligament reconstruction techniques: the impact of fixation level and fixation method under cyclic loading. Arthroscopy. 2002;18(3):304-15. doi: 10.1053/jars.2002.30609.
7. Debieux P, Franciozi CE, Lenza M, Tamaoki MJ, Magnussen RA, Faloppa F, et al. Bioabsorbable versus metallic interference screws for graft fixation in anterior cruciate ligament reconstruction. Cochrane Database Syst Rev. 2016; 7(7):CD009772. doi: 10.1002/14651858.CD009772.
8. McDermott E, DeFoor MT, Blaber OK, Aman ZS, DePhillipo NN, Dekker TJ. Biomechanical comparison of anterior cruciate ligament reconstruction fixation methods and implications on clinical outcomes. Ann Jt. 2023; 8:15. doi: 10.21037/aoj-22-52.
9. Myers P, Logan M, Stokes A, Boyd K, Watts M. Bioabsorbable versus titanium interference screws with hamstring autograft in anterior cruciate ligament reconstruction: a prospective randomized trial with 2-year follow-up. Arthroscopy. 2008;24(7):817-23. doi: 10.1016/j.arthro.2008.02.011.
10. Khadka T, Thapa PB, Kayastha N, Mishra R. Anterior cruciate ligament reconstruction with hamstring autograft using bioabsorbable versus titanium interference screw in tibial tunnel in Government Hospital of West Nepal. J Chitwan Med Coll. 2022;12(2):122-4. doi: 10.54530/jcmc.1104
11. Jajee N, Dhanraj P, Sriram S, Chakravarthy R. Comparison of functional outcome of arthroscopic anterior cruciate ligament reconstruction using quadrupled semitendinosus and gracilis graft fixed with bioabsorbable interference screw against titanium interference screw. Int J Orthop Sci. 2021;7(1):838-42. doi: 10.22271/ortho.2021.v7.i1m.2578
12. Parvez M, Kumar R, Kumar M, Subhash A, Kumar S, Kumar R. A prospective study to evaluate the functional and clinical outcome of anterior cruciate ligament reconstruction with standard hamstring autograft. J Indira Gandhi Inst Med Sci. 2023;9(1):32-6. doi: 10.4103/jigims.jigims_26_22
13. Sundaraj K, Salmon LJ, Heath EL, Winalski CS, Colak C, Vasanji A, et al. Bioabsorbable versus titanium screws in anterior cruciate ligament reconstruction using hamstring autograft: a prospective, randomized controlled trial with 13-year follow-up. Am J

Sports Med. 2020;48(6):1316-1326. doi: 10.1177/0363546520911024.
14. Vinoth KR, Reddy VN. Comparative analysis of the functional outcome of arthroscopic anterior cruciate ligament reconstruction using quadrupled hamstring graft fixed with bioabsorbable interference screw against titanium interference screw – a prospective short-term study. Int J Sci Res. 2019;8(9):74-9. doi: 10.36106/ijsr
15. Sharma P, Baghel A, Keshav K, Kumar A, Singh A, Singh AB. Functional outcomes of anterior cruciate ligament reconstruction using titanium adjustable loop button and poly-L-co-DL-lactic acid-beta tricalcium phosphate (PLDLA-bTCP) interference screws: a single-center, retrospective, observational study. Cureus. 2023;15(2): e34542. doi: 10.7759/cureus.34542.
16. Kumar BR, Aravind JD, Kumar HS. A comparative study of clinical and functional outcome of arthroscopic anterior cruciate ligament reconstruction using hamstring graft with aperture fixation versus suspensory device fixation. Int J Orthop Sci. 2021;7(3):116-24. doi: 10.22271/ortho.2021.v7.i3b.2737
17. Chaudhary D, Monga P, Joshi D, Easwaran R, Bhatia N, Singh AK. Arthroscopic reconstruction of the anterior cruciate ligament using bone-patellar tendon-bone autograft: experience of the first 100 cases. J Orthop Surg (Hong Kong). 2005;13(2):147-52. doi: 10.1177/230949900501300207.
18. Lewis DW, Chan D, Fisher O, Lechford R, Mintowt-Czyz WJ, Lewis MWD. Incidence of meniscal and chondral injuries at the time of ACL reconstruction, and their relationship with outcome at 2 years. Orthop Procs. 2012;94-B(SUPP_IX):41-41.
19. Lyman S, Koulouvaris P, Sherman S, Do H, Mandl LA, Marx RG. Epidemiology of anterior cruciate ligament reconstruction: trends, readmissions, and subsequent knee surgery. J Bone Joint Surg Am. 2009;91(10): 2321-2328. doi: 10.2106/JBJS.H.00539
20. Khatri NP, Bharali I, Khan I, Borgohain GS. Arthroscopic single-bundle anterior cruciate ligament reconstruction using the quadrupled hamstring tendon graft: a single-institution experience from north-eastern India. Cureus. 2023;15(6): e40547. doi: 10.7759/cureus.40547.
21. Drogset JO, Straume LG, Bjørkmo I, Myhr G. A prospective randomized study of ACL-reconstructions using bone-patellar tendon-bone grafts fixed with bioabsorbable or metal interference screws. Knee Surg Sports Traumatol Arthrosc. 2011;19(5):753-9. doi: 10.1007/s00167-010-1353-4.
22. Hofmann GO, Wagner FD, Beickert R, Gonschorek O, Buhren V. Anterior cruciate ligament reconstruction using patellar tendon autograft and bioresorbable interference screws. Eur J Trauma. 2001;27(5):241-249. doi: 10.1007/s00068-001-1089-4
23. Kotani A, Ishii Y. Reconstruction of the anterior cruciate ligament using poly-L-lactide interference screws or titanium screws: a comparative study. Knee. 2001;8(4):311-5. doi: 10.1016/s0968-0160(01)00087-4.
24. Xu B, Yin Y, Zhu Y, Yin Y, Fu W. Comparison of bioabsorbable and metallic interference screws for graft fixation during ACL reconstruction: a meta-analysis of randomized controlled trials. Orthop J Sports Med. 2021;9(8):23259671211021577. doi: 10.1177/23259671211021577
25. Fox JA, Nedeff DD, Bach BR Jr, Spindler KP. Anterior cruciate ligament reconstruction with patellar autograft tendon. Clin Orthop Relat Res. 2002;(402):53-63. doi: 10.1097/00003086-200209000-00006.
26. Kaeding C, Farr J, Kavanaugh T, Pedroza A. A prospective randomized comparison of bioabsorbable and titanium anterior cruciate ligament interference screws. Arthroscopy. 2005;21(2):147-51. doi: 10.1016/j.arthro.2004.09.012.

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