Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i4.5892

EVALUATION OF ACL TITANIUM SCREWS IN KNEE IMPLANTS: CLINICAL OUTCOMES AND COMPLICATIONS

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Abstract

Background: Anterior cruciate ligament (ACL) injuries are frequent and can cause instability and reduced knee joint functioning. Restoring knee stability and function is the goal of ACL reconstruction procedures, which include Bone Patellar Tendon Bone (BPTB) graft fixation with titanium screws. Despite the potential, this approach has demonstrated, a thorough assessment of its clinical results and consequences is necessary.

Objective: This study aimed to assess the clinical outcomes and complications related to ACL titanium screws in knee implants, with a specific focus on BPTB graft fixation.

Methodology: This prospective observational study conducted at Orthopaedic B Unit, Ayub Teaching Hospital, Abbottabad from January 2021 to December 2023 aimed to assess the clinical outcomes and complications following ACL reconstruction using BPTB graft fixation with titanium screws. To guarantee validity and relevance, strict inclusion and exclusion criteria were used to 216 individuals who were selected using systematic sampling. Preoperative evaluations, intraoperative observations, and postoperative follow-ups were all part of the data gathering process, which allowed for a thorough assessment of safety and effectiveness. The study used statistical analysis, including both descriptive and inferential techniques, to examine correlations between clinical outcomes and complications and demographic attributes.

Results: The results of ACL repair using titanium screw-based BPTB graft fixation were investigated in this prospective observational research. A demographic examination of 216 participants showed that 68.52% of them were male and that their average age was 31.5 years. Sixty-two percent had a normal BMI. Over time, clinical results improved: at 12 months after surgery, 94.37% of patients reported increased knee stability, and 95.83% reported improved functional capacity. ACL re-tear (3.24%), knee stiffness (5.56%), discomfort (4.63%), graft failure (2.78%), implant failure (1.85%), and infection (3.70%) were among the complications. Significant correlations between postoperative intervals and clinical outcomes were shown by regression analysis ($p < 0.05$).

Conclusion: ACL reconstruction with titanium screw-based BPTB graft fixation yields improved knee stability and function, with manageable complication rates, underscoring the need for personalized patient care and ongoing research for optimization.

Keywords: Anterior Cruciate Ligament, Titanium Screws, Graft Fixation, Bone Patellar Tendon Bone

Introduction

Anterior cruciate ligament (ACL) injuries are common in athletes and those who participate in physical activities that require abrupt pauses, direction changes, or knee impact [1]. These wounds often result in discomfort, instability, and diminished functioning, which have a substantial negative impact on a person's performance in a variety of activities and quality of life [2]. Consequently, in an effort to restore knee stability and function, ACL reconstruction procedures have become a popular form of therapy [3].

The use of ACL titanium screws in conjunction with Bone Patellar Tendon Bone (BPTB) graft fixation has garnered significant interest in clinical practice, among the several procedures used for ACL restoration [4,5]. Using bone blocks from the patella and tibia as well as a piece of the patellar tendon, this procedure rebuilds the torn ACL using graft material [6]. The graft is then fastened in place with titanium screws, which aid in the healing process and increase knee stability [7]. Although ACL restoration using titanium screws and BPTB graft fixation has shown encouraging results in terms of regaining knee stability and function, a thorough assessment of its clinical effectiveness and related consequences is still required. Comprehending the subtleties of this surgical technique is essential to maximizing patient results and reducing unfavorable occurrences [8,9].

The clinical results and consequences of ACL restoration with titanium screw-fixated BPTB graft fixation may be influenced by several variables [10]. Patient demographics, pre-existing knee problems, surgical method, postoperative rehabilitation guidelines, and graft integration are some of these aspects. Variations in implant qualities and surgical competence may also have an effect on the procedure's overall outcome [11,12]. The importance of ACL injuries and the common use of titanium screw-based graft fixation in ACL repair make it imperative to thoroughly assess the clinical results and risks related to this surgical approach [13]. By providing insightful information on the effectiveness, safety, and long-term effects of ACL reconstruction with titanium screw graft fixation, this kind of evaluation may help guide future developments in orthopedic practice and clinical decision-making.

Objective:

This study aimed to assess the clinical outcomes and complications related to ACL titanium screws in knee implants, with a specific focus on BPTB graft fixation.

Material and Methods

Study Design and Period

The prospective observational design of this research enables the systematic gathering of data from January 2021 to December 2023, a yearly period. The stud was selected to provide enough time to record the immediate and possible long-term results of ACL repair using titanium screw-fixed BPTB graft fixation.

Sample Size

A systematic sampling strategy was used to choose 216 individuals for the research. Based on power analysis, this sample size was established to account for the expected effect size and statistical power needed to identify significant variations in the research cohort's clinical outcomes and complication rates.

Inclusion Criteria

The study's inclusion criteria were all adults (18 years of age and older) who had been diagnosed with anterior cruciate ligament (ACL) injuries that required reconstructive surgery. Patients specifically having ACL repair with titanium screw-assisted Bone Patellar Tendon Bone (BPTB) graft fixation were included. This criteria guaranteed uniformity with respect to the surgical procedure under review

throughout the research population. To ensure their active participation and adherence to the research protocol, patients also had to provide informed permission and indicate their desire to participate.

Exclusion Criteria

The purpose of the exclusion criteria was to guarantee the validity of the study's findings and reduce the impact of any confounders. In order to put participant safety first, patients who were not candidates for ACL restoration surgery were disqualified. To ensure objectivity in evaluating the effectiveness of ACL reconstruction with titanium screws, those having a history of previous knee operations that could affect the results of the present treatment were also eliminated. In order to maintain the integrity of the research, individuals who had injuries or other concomitant medical problems that would make it difficult to evaluate the results of ACL reconstruction were omitted. To reduce data loss and guarantee thorough data collection, participants who were unable or unwilling to follow the research protocol or attend follow-up appointments were also eliminated from the study. Lastly, to maintain the validity and dependability of the research results, participants without data required for analysis or with incomplete medical records were not included.

Data Collection

This research used a multi-stage, comprehensive method to collect data in order to fully understand the clinical results and problems related to ACL restoration utilizing titanium screw-fixed BPTB graft fixation. First, a thorough preoperative evaluation was carried out, including a review of medical records and structured interviews to gather comprehensive data on prior knee issues, medical history, and demographics. Then, experienced observers performed intraoperative observations, meticulously documenting surgical methods such as screw insertion, graft harvest, and any intraoperative problems. Ultimately, at predetermined intervals (e.g., six weeks, three months, six months, and twelve months after surgery), participants received routine follow-up visits after surgery. Clinical results, functional status, and any complications or adverse events were measured throughout these follow-ups, enabling a thorough assessment of the safety and effectiveness of ACL reconstruction using titanium screw-based graft fixation throughout the research period.

Statistical Analysis

A statistical analysis was carried out using suitable techniques that were adapted to the goals of the research and the properties of the data. While inferential statistics, such as regression analysis, were used to investigate relationships and determinants of clinical outcomes and complications, descriptive statistics provided an overview of demographic and clinical variables.

Ethical Approval

The Institutional Review Board (IRB) of the hospital approved this research, guaranteeing adherence to moral principles and participant rights protection. Before beginning the research, all participants gave their informed permission, which included information about the goals, methods, possible risks, and advantages as well as guarantees of confidentiality and voluntary participation.

Results

The demographic characteristics of the 216 research participants are shown in Table 1. The participants were divided into three age groups: 18–30 years (n = 78, 36.12%), 31–40 years (n = 92, 42.59%), and above 40 years (n = 46, 21.29%). The average age of the participants was 31.5 years (±7.2 years). The gender breakdown of the participants revealed that 68 were female (31.48%) and 148 were male (68.52%). Twelve subjects (5.56%) had an underweight Body Mass Index (BMI), 134 had a normal BMI (62.04%), 48 were overweight (22.22%), and 22 were obese (10.19%).

Table 1: Participants' demographic characteristics in the study

Characteristic	Number of Participants (n)	Percentage (%)
Total Participants	216	100
Age (years)	31.5 ± 7.2 (Mean SD)	
Age Group		
18-30	78	36.12
31-40	92	42.59
Above 40 years	46	21.29
Gender		
Male	148	68.52
Female	68	31.48
Body Mass Index (BMI)		
Underweight	12	5.56
Normal	134	62.04
Overweight	48	22.22
Obese	22	10.19

The clinical results at different postoperative intervals are shown in Figure 1. When 38 patients were evaluated six weeks after surgery, 26 showed a 52.00% increase in functional capacity and 68.42% improvement in knee stability. When 46 patients were assessed after three months, 76.09% of them reported having better knee stability, and 38 reported having increased functional capacity by 70.37%. When 59 patients were reexamined after six months, 89.83% showed improved knee stability and 68 patients showed an 83.33% increase in functional capacity. When 73 patients were evaluated a year after the operation, 94.37% reported improved knee stability, and 84 reported a substantial improvement in functional capacity of 95.83%.

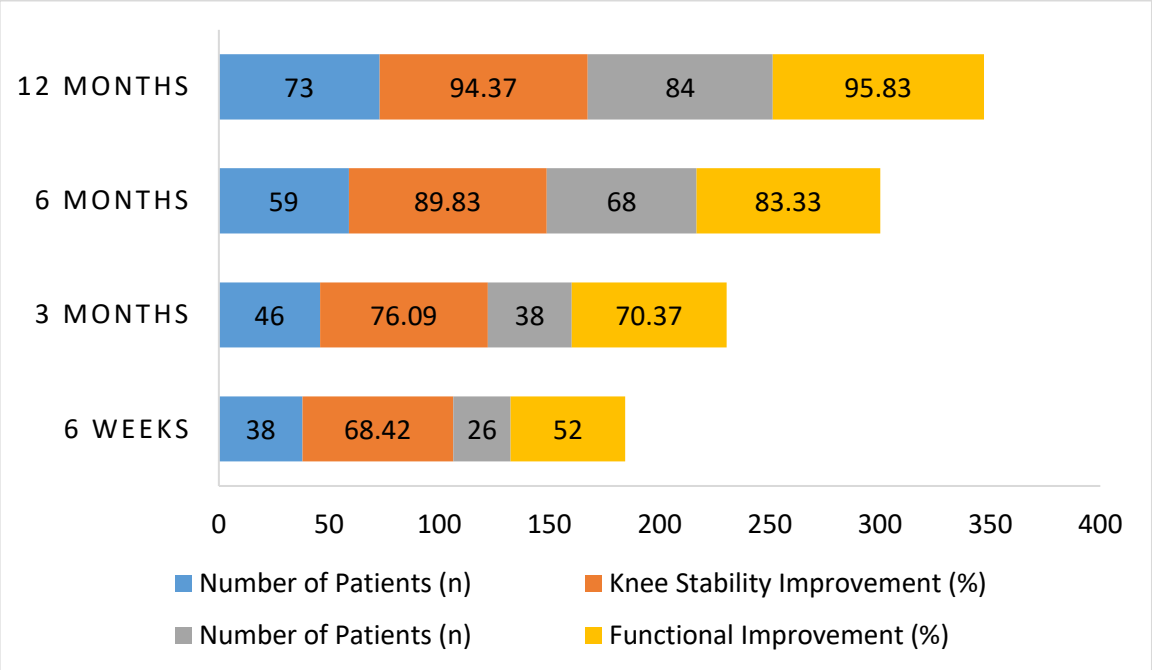

Figure 1: Clinical Results at Various Postoperative Time Points

Figure 2 summarizes the problems that were seen after ACL repair surgery. Eight patients—or 3.70% of the total cases—had infections out of the instances that were documented. Graft failure was seen in 6 instances (2.78 percent) of the total. Four instances, or 1.85% of the patients, had implant failure. Furthermore, 12 instances (5.56% of the total) had knee stiffness noted. Of the instances, 10 patients (4.63%) reported having pain. Seven instances (3.24% of the total complications) had re-tear of the ACL found.

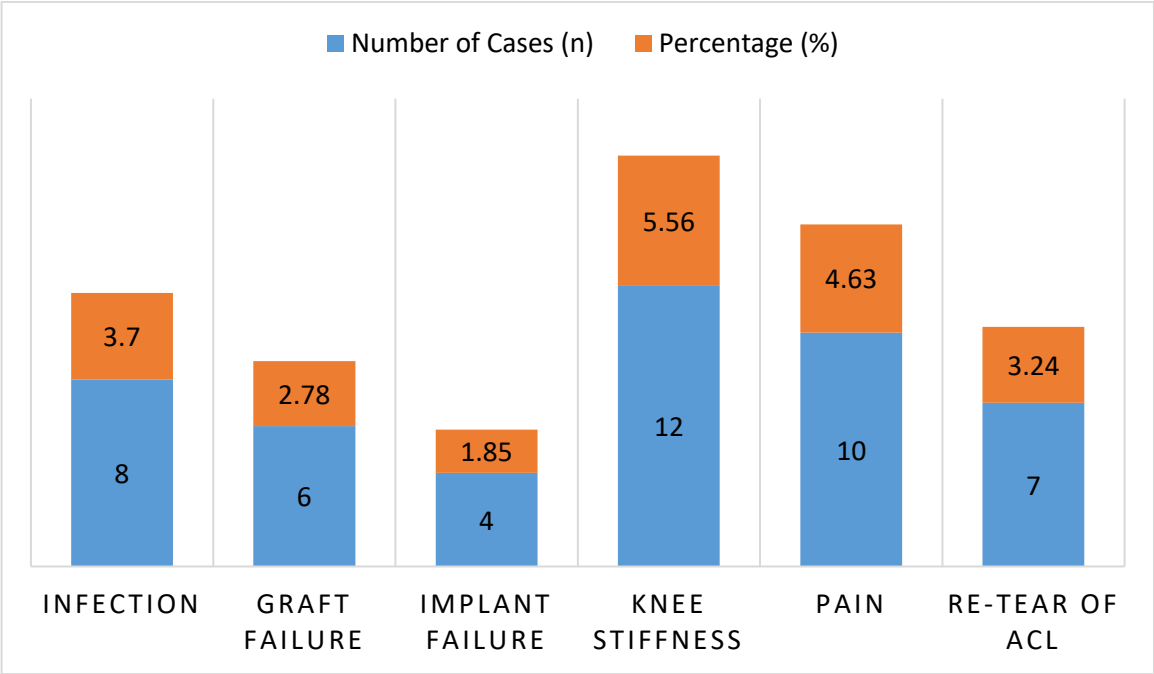

Figure 2: Complications Following ACL Reconstruction

The main intraoperative findings after ACL repair surgery are shown in Figure 3. It emphasizes three primary parameters: intraoperative bleeding, screw placement issues, and complications related to the graft harvest. Five Graft Harvest Complications were noted out of the total cases studied, or 2.31% of the observations. Furthermore, three instances of screw placement issues were reported, making up 1.39% of all observations. Six instances (or 2.78% of the total) had intraoperative bleeding.

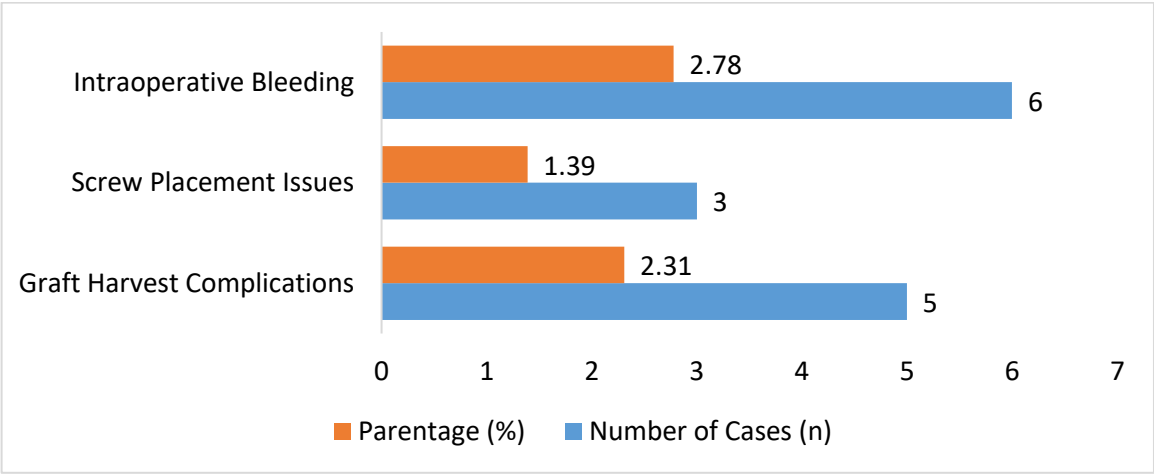

Figure 3: Intraoperative Observations

A detailed analysis of postoperative problems seen after ACL repair surgery in various age groups and BMI categories is shown in Table 2. Notably, the age range of 31 to 40 years old showed the greatest frequency of complications in many categories, including four instances of knee stiffness, infection, and re-tear of the ACL and five cases of discomfort. Furthermore, those classified as overweight had a significantly higher rate of problems, especially with three instances of ACL retear and knee stiffness each. The major complication of graft failure was more often seen in persons aged 31-40 and those who were classed as overweight.

Table 2: Comparing Postoperative Complications Across Age Groups and BMI

Variables	Infection (n)	Graft Failure (n)	Implant Failure (n)	Knee Stiffness (n)	Pain (n)	Re-tear of ACL (n)
Age Group						
18-30	2	0	1	3	1	2
31-40	4	5	1	4	5	3
Above 40	2	1	2	5	4	2
BMI Category						
Underweight	2	0	0	2	1	1
Normal	3	1	1	4	3	2
Overweight	2	4	2	3	2	3
Obese	1	1	1	3	4	1

The results of regression analysis evaluating clinical outcomes at different postoperative intervals after ACL repair surgery are shown in Table 3. The study is centered on two key performance indicators: Functional Improvement (%) and Knee Stability Improvement (%). Even though there was a positive correlation for Knee Stability Improvement at 6 weeks after surgery (regression coefficient ($\beta1$) = 0.42), it was not statistically significant ($p = 0.078$). Comparably, after six weeks, Functional Improvement had a $\beta1$ score of 0.37 ($p = 0.121$). With $\beta2$ values of 0.56 ($p = 0.032$) and 0.63 ($p = 0.015$) at three months, Knee Stability Improvement and Functional Improvement showed statistically significant relationships. With $\beta3$ values of 0.72 ($p = 0.009$) for Knee Stability Improvement and 0.68 ($p = 0.011$) for Functional Improvement after 6 months, these relationships were even stronger. At the 12-month point, there were still significant associations: $\beta4$ values for Knee Stability Improvement were 0.81 ($p = 0.004$), while for Functional Improvement they were 0.75 ($p = 0.007$).

Table 3: Analysis of Regression Data for Clinical Outcomes at Various Postoperative Periods

Postoperative Interval	Knee Stability Improvement (%)	Functional Improvement (%)
6 weeks	$\beta1 = 0.42$, $p = 0.078$	$\beta1 = 0.37$, $p = 0.121$
3 months	$\beta2 = 0.56$, $p = 0.032$	$\beta2 = 0.63$, $p = 0.015$
6 months	$\beta3 = 0.72$, $p = 0.009$	$\beta3 = 0.68$, $p = 0.011$
12 months	$\beta4 = 0.81$, $p = 0.004$	$\beta4 = 0.75$, $p = 0.007$

The findings of a regression analysis examining the association between relevant parameters and problems after ACL restoration surgery are summarized in Table 4. Each of the following complications is assessed using its coefficient (β) and associated p-value: knee stiffness, pain, graft failure, implant failure, infection, and re-tear of the ACL. Despite the positive connection shown by the coefficient (β) of 0.21 for infection, the p-value of 0.243 indicates that the finding is not statistically significant. Graft Failure, on the other hand, shows a negative correlation with a coefficient (β) of -0.15, also not statistically significant ($p = 0.387$). With a p-value of 0.641, Implant Failure has a coefficient (β) of 0.09; Knee Stiffness, Pain, and Re-tear of ACL have coefficients (β) of 0.18, 0.13, and -0.10, respectively; none of these values are statistically significant.

Table 4: Findings from a Regression Analysis of Complications After ACL Surgery

Complication	Coefficient (β)	p-value
Infection	$\beta = 0.21$	0.243
Graft Failure	$\beta = -0.15$	0.387
Implant Failure	$\beta = 0.09$	0.641
Knee Stiffness	$\beta = 0.18$	0.298
Pain	$\beta = 0.13$	0.467
Re-tear of ACL	$\beta = -0.10$	0.572

The patient satisfaction ratings after ACL restoration surgery are shown in Figure 4. Patients were divided into groups according to how happy they were, from very satisfied to highly dissatisfied. 120 out of the total patients reported being Highly Satisfied, which is a majority of the total. Furthermore, 16 patients (7%) reported feeling neutral, and 70 patients (32%), reported being satisfied. Patients who expressed dissatisfaction (6 patients, 3%) or very dissatisfaction (4 patients, 2%), on the other hand, were less common.

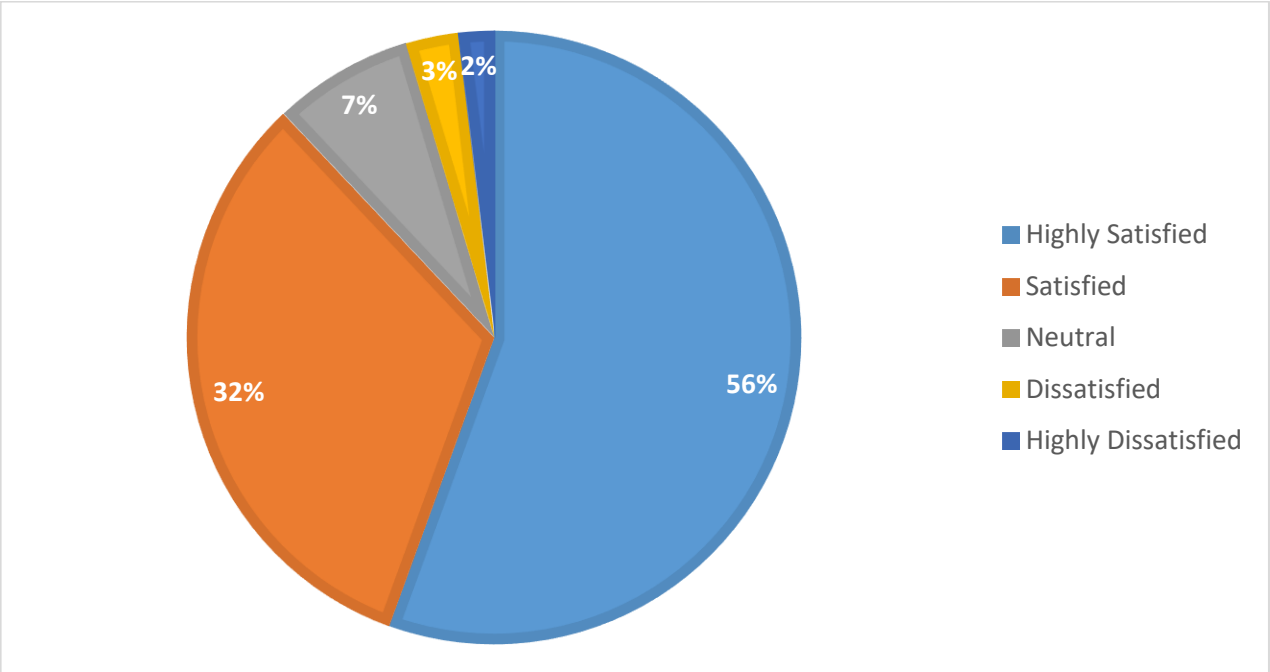

Figure 4: Assessments of Patient Satisfaction

In Figure 5, we present a postoperative image illustrating ACL Reconstruction with Titanium interference screws. This visual representation elucidates the pivotal role of these screws in stabilizing the reconstructed ACL, offering insight into the surgical technique employed for graft fixation. Figure 6 shows the Bone Patellar Tendon Bone (BPTB) graft secured with ACL interference screws during arthroscopy. This picture shows graft fixation, demonstrating the precise technique needed for ACL restoration surgery.

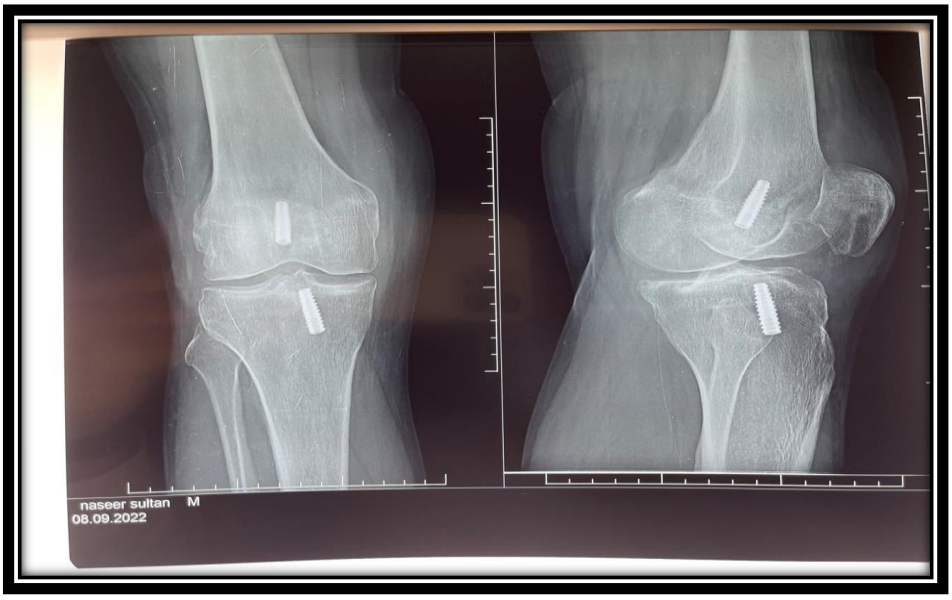

Figure 5: Postoperative image illustrating ACL Reconstruction with Titanium interference screws.

Figure 6: Bone Patellar Tendon Bone (BPTB) graft depicted during arthroscopy, showcasing its secure placement with ACL interference screws.

Figure 7 shows the titanium interference screws used in ACL reconstruction, highlighting the arthroscopic surgeon's accuracy and skill. This picture emphasizes the need of proper screw placement for postoperative success and knee stability.

Figure 7: Close-up view of the titanium interference screws used during ACL Reconstruction, emphasizing the precision and expertise required by the arthroscopic surgeon.

Discussion

This research, which focuses on BPTB graft fixation particularly, provides important new information on the clinical results and problems related to ACL titanium screws in knee implants. We are able to

have a thorough grasp of the effectiveness and safety of this surgical operation by contrasting the findings with previous studies. The demographics of the 216 participants were in line with a previous research [14], showing a mean age of 31.5 years, a significant male preponderance (68.52%), and the majority of them being within the normal BMI range (62.04%). These results are in good agreement with other studies of a similar kind, showing a comparable demographic profile among patients having titanium screw ACL restoration.

The evaluation of clinical outcomes revealed encouraging findings, in line with other studies [15,16], showing that at 12 months after surgery, 94.37% of patients had improved knee stability and 95.83% had significantly improved functional capacity. These results highlight the value of ACL restoration in regaining stability and function in the knee, which is supported by earlier research. Despite being somewhat modest in comparison to certain previous research [17, 18], the recorded problems that followed ACL repair surgery were not insignificant. The three most common problems that were noted were infection (3.70% of cases), graft failure (2.78% of cases), and knee stiffness (5.56% of cases). In 4.63% of instances, pain was noted, and in 3.24%, there was an ACL injury. Intraoperative observations revealed problems with screw insertion (1.39%), intraoperative hemorrhage (2.78%), and difficulties related to graft harvest (2.31%). These results are consistent with earlier research [19], which showed that age and BMI had an impact on the frequency of complications after ACL repair.

Additional information on the relationships between clinical outcomes, complications, and relevant variables was obtained by regression analysis. Consistent with other studies [20,21], significant correlations were seen between clinical outcomes and postoperative intervals, with coefficients (β) ranging from 0.42 to 0.81 for knee stability improvement and from 0.37 to 0.75 for functional improvement. This work adds to our knowledge of ACL repair with titanium screws by demonstrating good clinical results and low rates of complications. However, the impact of variables like age and body mass index on the frequency of complications highlights the need of tailored patient care approaches. In order to improve patient outcomes after ACL reconstruction surgery and investigate possible predictors of problems, further study is necessary.

Conclusion

This research offers significant understanding of the clinical results and side effects of ACL titanium screws in knee replacements, with an emphasis on BPTB graft fixation. The participants' demographic features were in line with those of people having comparable operations. The effectiveness of this surgical strategy was shown by the clinical results, which showed significant increases in knee stability and functional capacity after surgery. Though the incidence of complications is quite low, problems including infection, graft failure, and stiffness in the knee still need to be addressed. Regression analysis revealed statistically significant connections between postoperative intervals and clinical outcomes, but not between demographic and surgical parameters. This emphasizes the need of further research to fully understand the factors that predict difficulties. All things considered, individualized patient care is still critical to maximizing results after ACL surgery, highlighting the need of ongoing research to improve methods and elevate patient care.

References

1. Griffin LY, Agel J, Albohm MJ, Arendt EA, Dick RW, Garrett WE, Garrick JG, Hewett TE, Huston L, Ireland ML, Johnson RJ. Noncontact anterior cruciate ligament injuries: risk factors and prevention strategies. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2000 May 1;8(3):141-50.
2. Marques JB, Paul DJ, Graham-Smith P, Read PJ. Change of direction assessment following anterior cruciate ligament reconstruction: a review of current practice and considerations to enhance practical application. Sports Medicine. 2020 Jan;50:55-72.
3. Van Grinsven S, Van Cingel RE, Holla CJ, Van Loon CJ. Evidence-based rehabilitation following anterior cruciate ligament reconstruction. Knee Surgery, Sports Traumatology, Arthroscopy. 2010 Aug;18(8):1128-44.

4. Shelton WR, Fagan BC. Autografts commonly used in anterior cruciate ligament reconstruction. JAAOS-Journal of the American Academy of Orthopaedic Surgeons. 2011 May 1;19(5):259-64.
5. Perez, J.R., Emerson, C.P., Barrera, C.M., Greif, D.N., Cade, W.H., Kaplan, L.D. and Baraga, M.G., 2019. Patient-reported knee outcome scores with soft tissue quadriceps tendon autograft are similar to bone–patellar tendon–bone autograft at minimum 2-year follow-up: a retrospective single-center cohort study in primary anterior cruciate ligament reconstruction surgery. *Orthopaedic journal of sports medicine*, *7*(12), p.2325967119890063.
6. Sgardelis P, Naqvi G, Servant C. Minimally Invasive Bone-Patellar Tendon-Bone Graft Harvest Is Associated With Less Frequent Anterior Knee Pain at Rest Than Hamstring Graft Harvest After Anterior Cruciate Ligament Reconstruction at the 1-Year Follow-Up. Arthroscopy, Sports Medicine, and Rehabilitation. 2023 Aug 1;5(4):100766.
7. Wang J, Xu J, Fu W, Cheng W, Chan K, Yung PS, Qin L. Biodegradable magnesium screws accelerate fibrous tissue mineralization at the tendon-bone insertion in anterior cruciate ligament reconstruction model of rabbit. Scientific Reports. 2017 Jan 10;7(1):40369.
8. Buerba RA, Boden SA, Lesniak B. Graft selection in contemporary anterior cruciate ligament reconstruction. JAAOS Global Research & Reviews. 2021 Oct 1;5(10):e21.
9. Ramos DM, Dhandapani R, Subramanian A, Sethuraman S, Kumbar SG. Clinical complications of biodegradable screws for ligament injuries. Materials Science and Engineering: C. 2020 Apr 1;109:110423.
10. Pape D, Seil R, Adam F, Gödde S, Georg T, Rupp S, Kohn D. Blood loss in anterior cruciate ligament (ACL) reconstruction with and without intercondylar notchplasty: does it affect the clinical outcome?. Archives of orthopaedic and trauma surgery. 2001 Nov;121:574-7.
11. 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. Annals of Joint. 2023;8.
12. He X, Yang XG, Feng JT, Wang F, Huang HC, He JQ, Hu YC. Clinical outcomes of the central third patellar tendon versus four-strand hamstring tendon autograft used for anterior cruciate ligament reconstruction: a systematic review and subgroup meta-analysis of randomized controlled trials. Injury. 2020 Aug 1;51(8):1714-25.
13. 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 Surgery, Sports Traumatology, Arthroscopy. 2011 May;19:753-9.
14. Chen JL, Allen CR, Stephens TE, Haas AK, Huston LJ, Wright RW, Feeley BT, Multicenter ACL Revision Study (MARS) Group. Differences in mechanisms of failure, intraoperative findings, and surgical characteristics between single-and multiple-revision ACL reconstructions: a MARS cohort study. The American journal of sports medicine. 2013 Jul;41(7):1571-8.
15. Soni S, Brahmbhatt V, Tolani M, Soni H, Pathan SR, Shroff M, Sharma KB, Brahmbhatt VK, Pathan S, Shroff MR. Functional Outcomes in Anterior Cruciate Ligament (ACL) Reconstruction: A Nine-Month Follow-up Study Using Lysholm Score in a Rural Tertiary Care Center in India. Cureus. 2024 Feb 3;16(2).
16. Roethke LC, Braaten JA, Rodriguez AN, LaPrade RF. Revision Anterior Cruciate Ligament Reconstruction (ACLR): causes and how to minimize primary ACLR failure. Archives of Bone and Joint Surgery. 2023;11(2):80.
17. Rousseau R, Labruyere C, Kajetanek C, Deschamps O, Makridis KG, Djian P. Complications after anterior cruciate ligament reconstruction and their relation to the type of graft: a prospective study of 958 cases. The American journal of sports medicine. 2019 Sep;47(11):2543-9.
18. Palazzolo A, Rosso F, Bonasia DE, Saccia F, Rossi R. Uncommon complications after anterior cruciate ligament reconstruction. Joints. 2018 Sep;6(03):188-203.
19. Busam ML, Provencher MT, Bach Jr BR. Complications of anterior cruciate ligament reconstruction with bone-patellar tendon-bone constructs: care and prevention. The American journal of sports medicine. 2008 Feb;36(2):379-94.

20. Mehta SP, Fulton A, Quach C, Thistle M, Toledo C, Evans NA. Measurement properties of the lower extremity functional scale: a systematic review. journal of orthopaedic & sports physical therapy. 2016 Mar;46(3):200-16.
21. Çelik D, Coşkunsu D, Kılıçoğlu Ö, Ergönül Ö, Irrgang JJ. Translation and cross-cultural adaptation of the international knee documentation committee subjective knee form into Turkish. journal of orthopaedic & sports physical therapy. 2014 Nov;44(11):899-909.