CORRELATION OF FUNCTIONAL STATUS OF ARTHROSCOPIC ACL RECONSTRUCTION FOR PREVENTION OF TITANIUM INTERFERENCE SCREW

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ABSTRACT

Introduction: Due to an increase in traffic accidents and more common people participating in sports-related activities, knee injuries are more frequent today. The knee’s anterior cruciate ligament is the ligament that gets injured the most frequently. The principal stabiliser that prevents the anterior translation of the tibia over the femur is the anterior cruciate ligament, which plays a pivotal role in the stability and function of the knee joint. The gold standard for treating these injuries is arthroscopic anterior cruciate ligament reconstruction.

Methods: This study is a retrospective and prospective analysis of 60 patients who underwent arthroscopic reconstruction of the anterior cruciate ligament using a quadrupled hamstring graft with an endobutton as the femoral fixation device and a titanium interference screw (no=30) or a bioabsorbable interference screw (no=30) as the tibial fixation device.

Results: This study is a retrospective and prospective analysis of 60 patients who underwent arthroscopic reconstruction of the anterior cruciate ligament using a quadrupled hamstring graft with an endobutton as the femoral fixation device and a titanium interference screw (no=30) or a bioabsorbable interference screw (no=30) as the tibial fixation device.

Conclusion: Clinical outcomes for interference screws made of titanium and bioabsorbable material are statistically comparable. The two screws’ complication rates were comparable as well. This comparison analysis’s findings are consistent with the claim that titanium screws and bioabsorbable screws both produce comparable results when used for ACL restoration.

KEYWORDS Anterior cruciate ligament, quadrupled hamstring graft, titanium, bioabsorbable, interference screw, endobutton, arthroscopy.
have made ACL reconstruction with an arthroscopic aided approach the preferred course of treatment (5). Arthroscopy is superior to open surgery and is preferred because it reduces post-operative swelling and allows for an early full range of motion.

More soft tissue grafts are being used today than bone patellar tendon bone transplants. During ACL reconstruction, either metal or biodegradable screws can be used to fix the graft. Utilizing bioabsorbable screws improves visibility in postoperative MRIs and prevents removal at a later time. On the other hand, the optimum graft, the ideal fixation method, and the ideal reconstructive approach remain controversial.

Although it is intra-articular, the anterior cruciate ligament is a powerful extra synovial ligament. It has a multi-fascicular structure that extends from the medial face of the lateral femoral condyle to the posterior and lateral portions of the anterior part of the tibia. The ligament has a cross-section of 31.3 mm² and is 31 to 35 mm in length.

Methods

The 60 patients who underwent arthroscopic anterior cruciate ligament reconstruction using a quadrupled hamstring graft with an endobutton as the femoral fixation device and a titanium interference screw (no=30) or a bioabsorbable interference screw (no=30) as the tibial fixation device were studied. The patients who had previously undergone ACL surgery of either knee were included in this study. However, those patients who had previously undergone ACL surgery had any co-existing local conditions in the form of -Active articular infection - Inflammatory joint disease, any additional ligamentous laxity in the affected knee, chronic muscle disorders, metabolic bone disease or neoplastic disease, were excluded.

Results

60 arthroscopy-aided cases Anterior cruciate ligament reconstruction utilising a quadrupled hamstring tendon graft was monitored for 6 months to 1.5 years. The femoral fixation device was an endobutton. The tibial fixation device was either a titanium interference screw (no=30) or a bioabsorbable interference screw (no=30). A 10.5-month follow-up was the average. The average age was 31.6 years, with a minimum age of 20 and a maximum age of 55 (Table 1).

We saw most of our patients in the younger age bracket of 21–25 years. In our survey, there was a predominance of men. Left side involvement was less common than on the right. The most frequent reason for ACL injury was a car accident. More damage to the medial meniscus than the lateral meniscus was present (Table 2). At 4 months, the majority of patients were back to their pre-functional state.

Discussion

Due to an increase in sports participation and traffic accidents during the past ten years, there has been a significant rise in the incidence of anterior cruciate ligament reconstruction (6). Knee instability problems that occur repeatedly call for surgical intervention. In the modern era, arthroscopic ACL reconstruction has replaced open surgery as the gold standard.

Even though arthroscopic reconstruction has become common, there is ongoing disagreement about the best type of graft to use, how to fixate it, and whether to reconstruct transtibial
### Table 1 Distribution of age and sex

| Age     | Patients | Percentage |
|---------|----------|------------|
| 15-20   | 4        | 6.67       |
| 21-25   | 15       | 25         |
| 26-30   | 13       | 21.67      |
| 31-35   | 12       | 20         |
| 36-40   | 5        | 8.33       |
| 41-45   | 8        | 13.33      |
| 46-50   | 1        | 1.66       |
| 51-55   | 2        | 3.33       |
| Total   | 60       | 100        |

| Sex     |          |            |
|---------|----------|------------|
| Male    | 50       | 83.33      |
| Female  | 10       | 16.67      |

### Table 2 Duration of injury and associated injury

| Duration after injury | Patients | Percentage |
|-----------------------|----------|------------|
| <6 weeks              | 11       | 18.33      |
| 6-3 months            | 12       | 20         |
| 3-6 months            | 15       | 25         |
| 6-12 months           | 13       | 21.67      |
| >12 months            | 9        | 15         |
| Total                 | 60       | 100        |

| Associated injury     |          |            |
|-----------------------|----------|------------|
| Lateral meniscus tear | 4        | 6.67       |
| Medial meniscus tear  | 12       | 20         |
| Nil                   | 41       | 68.33      |
| Both                  | 3        | 5          |
or transport. The ACL has been extensively researched over the past ten years, and numerous academic studies on the methods and results of ACL reconstruction have been published. The purpose of reconstruction is to create a normal, stable joint with full functionality and to avoid issues like meniscal damage and subsequent osteoarthritis that can occur after an ACL tear.

Our research aims to assess the functional results of arthroscopic single bundle ACL reconstruction with quadrupled hamstring graft using transtibial and transportal techniques, using endobutton as a femoral fixation device, titanium interference screw in 30 patients, and bioabsorbable interference screw in 30 patients as a tibial fixation device.

Regardless of the type of graft, the fixation is the point of failure rather than the graft itself, especially in the early stages of rehabilitation when graft integration has not yet occurred. The fixation is of little significance after 8 to 12 weeks when the graft has integrated with the bone, as suggested by Dawn T. Gulick (7).

Soft tissue grafts are now more reliable and can be used with greater frequency thanks to a variety of graft fixation technologies that have been developed recently. Strong fixation was suggested as the secret to success in soft tissue grafts by Steiner et al. Based on his biomechanical study comparing various fixation techniques, Petterikousa (9) concluded that the bone mulch screw is the best device for delivering stronger attachment of soft tissue grafts, with the endobutton coming in second place. Two instances of femoral cross pin failure were recorded by Robert G. Marx (10). Endobuttons were demonstrated by Chae Gwan Kong (11) to be superior to cross pins for femoral fixation. While Young Ho Oh demonstrated that a hybrid fixation in the femoral tunnel using an endobutton and a bio screw offered sufficient stability and stiffness. Andreas Weiler published his findings demonstrating the superiority of bioabsorbable round contoured screws over conventional titanium interference screws. As a femoral fixation device and a titanium interference screw, respectively, we used endobuttons. A recent study found that tunnel widening was more common with interference screws than endobuttons and attributed tunnel widening to biological factors rather than mechanical ones of the fixation device, despite concerns about the bungee effect of the graft while using endobutton causing movement of the graft in the tunnel, widening of the tunnel, and interference to graft incorporation. No pull-outs or graft attachment site failures occurred in our investigation, and the endobutton was able to sustain postoperative rehabilitation.

With a P value of 0.97, our study’s functional result evaluation using Lysholm and Gillquist scoring found that the titanium interference screw study group and the bioabsorbable interference screw study group had substantially identical functional outcomes. According to our research, there are no appreciable differences between the results of using titanium and bioabsorbable interference screws for anterior cruciate ligament restoration.

Since our study was a short-term follow-up, we were unable to remark on the post-operative arthritic changes. As opposed to the 13 percent occurrence in our study, Fox et al. (12) and Apostolopoulos (13) reported a 3 to 17 percent incidence of anterior knee pain. In 2005, Kurt Spindler (14) claimed that regular exercise can improve results. Our patients are put on a home-based physical therapy regimen that strongly emphasises quadriceps strength and knee flexion, with a mean flexion reached 135 degrees. According to J A Grant’s (15) analysis, home-based physical therapy is equally as beneficial as supervised programmes in terms of cost. Overall, it can be said that a variety of factors affect how well the arthroscopic ACL reconstruction functions. The ultimate results can be significantly changed by factors such as graft selection, graft fixation, tunnel placement, and graft tensioning.

Conclusion
The findings of our investigation were comparable to other published studies that compared interference screws made of metal and bioabsorbptive materials. Our work demonstrates that the functional effect was the same whether titanium or bioabsorbable interference screw was employed. The optimal surgical technique, exact graft location, and rehabilitation techniques are more important to the success of ACL repair than the type of graft fixation device used—neither titanium nor bioabsorbable screws.

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Conflict of interest
There are no conflicts of interest to declare by any of the authors of this study.

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