



Comparison of the Early-Middle Period Results of the All-Inside Method and the Transtibial Method in Anterior Cruciate Ligament Reconstruction

Ön Çapraz Bağ Rekonstrüksiyonunda All-Inside Yöntem ile Transtibial Yöntemin Erken-Orta Dönem Sonuçlarının Karşılaştırılması

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Abstract

Aim: This study compares transtibial and All-inside techniques frequently used in ACL reconstruction.

Material and Method: Patients with acute or chronic ACL rupture, reconstruction with one of the transtibial and All-inside techniques, using hamstring autograft, having adequate pre- and postoperative documentation and completing the 24th postoperative month were included in the study and compared retrospectively.

Results: Forty-five patients, 22 of whom were operated on with the transtibial technique and 23 with the All-inside technique, were included in the study. Age, sex-sex distribution and BMI values were similar. While better clinical results were obtained in the early postoperative period in the all-inside group, the results were identical in both groups at 2-year follow-ups.

Conclusion: Transtibial and All-inside techniques are reliable and promise good clinical results in ACL reconstructions.

Keywords: ACL, All-inside, transtibial, reconstruction

Öz

Amaç: Bu çalışma, ÖÇB rekonstrüksiyonunda transtibial ve All-inside tekniklerini karşılaştırmaktadır.

Gereç ve Yöntem: Akut veya kronik ÖÇB rüptürü olan, transtibial veya All-inside tekniklerinden biriyle rekonstrüksiyon yapılan ve hamstring otogrefti kullanılan hastalar retrospektif olarak çalışmaya dahil edildi.

Bulgular: Çalışmaya 22'si transtibial teknikle, 23'ü All-inside tekniğiyle opere edilen 45 hasta dahil edildi. Yaş, cinsiyet dağılımı ve VKİ değerleri benzerdi. All-inside grubunda postoperatif erken dönemde daha iyi klinik sonuçlar elde edilirken, 2 yıllık takipte sonuçlar her iki grupta da benzerdi.

Sonuç: Transtibial ve All-inside teknikleri her ikisi de güvenilirdir ve ÖÇB rekonstrüksiyonlarında iyi klinik sonuçlar vaat etmektedir.

Anahtar Kelimeler: ACL, All-inside, transtibial, rekonstrüksiyon



INTRODUCTION

Anterior cruciate ligament (ACL) injuries are common and essential injuries to the knee region. The increased sports activities and accessibility in diagnosis-treatment processes cause us to see ACL injuries more frequently. The ACL plays a crucial role in the anteroposterior and rotational stability of the knee joint. Therefore, after ACL injury, instability may develop.^[1,2] ACL treatment principles vary due to increasing surgical techniques and changing rehabilitation programs in recent years. Both the selection of the graft to be used and the method of fixation of the graft are among the main topics discussed. Opening tunnels with the transtibial (TT) method is a method that has been used for many years and has proven its success.^[3] In recent years, the all-inside technique, which has come to the forefront with its features such as opening sockets instead of tunnels and dual suspensory fixation, has started to be used widely.^[4] This study compares patients' clinical outcomes who underwent ACL reconstruction with TT and All-inside techniques.

MATERIAL AND METHOD

This research has been approved by the IRB of the authors. **The inclusion criteria are as follows:** Patients with acute or chronic ACL rupture who underwent reconstruction with either the transtibial or All-inside techniques using hamstring autograft, and who had adequate pre- and postoperative documentation, with a completed 24-month follow-up.

The exclusion criteria are as follows: Patients with meniscal repair, advanced chondral lesions, collateral ligament repair, incomplete documentation, and those who did not complete their 24-month follow-up. In terms of clinical evaluation, parameters such as preoperative age, gender, surgical site, Body Mass Index (BMI), visual analogue scale (VAS), Tegner-Lysholm activity scale, Knee Society Score (KSS), International Knee Documentation Committee (IKDC), Knee Injury and Osteoarthritis Outcome Score (KOOS) were taken into account for the evaluation. In the TT method, an endobutton was used for the femoral fixation of the graft, and a U stable and a bioabsorbable screw were used for the fixation of the tibia in all patients. All patients used an endobutton for both femoral and tibial graft fixation in the all-inside method.

Statistical Analysis

Conformity of continuous variables to normal distribution was tested with the Shapiro-Wilk test. Descriptive statistics were used to describe continuous variables. (mean, standard deviation, minimum, median, maximum).

The comparison of two independent and non-normally distributed variables was made using the Mann-Whitney U test. A comparison of two independent and normally distributed variables was made with Student's t-test.

Chi-Square (or Fisher Exact test, Continuity Correction, Likelihood Ratio where appropriate) was used to examine the relationship between categorical variables.

The comparison of dependent and non-normally distributed variables was made using the Wilcoxon test. Comparing two variables with dependent and normal distribution was made with Paired Samples t-test.

A comparison of more than two variables that did not fit the dependent and normal distribution was made with the Friedman test.

The statistical significance level was determined as 0.05. Analyses were performed using MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; <http://www.medcalc.org>; 2013).

Ethical Approval

The study was carried out with the permission of Maltepe University Faculty of Medicine Hospital Ethics Committee (Date: 18.12.2019, Decision No: 2019/900/74). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

RESULTS

The general information about the patients is summarised in **Table 1**.

	TT	All-inside
Number (n)	22	23
Age	35,5(min:18-max:56)	32(min:16-max:47)
Gender		
Male	19	15
Female	3	8
Side		
Right	12	11
Left	10	12
Follow-up time (months)	48,5 (min:35-max:71)	28,5 min:24-max:38)
Body mass index (BMI)	24,91±3,27 std (min:19,3-max:33,7)	26,17±2,77 std (min:22-max:33,3)

Semitendinosus and gracilis tendon (ST-G) grafts were taken from the ipsilateral extremity in 6 patients in the all-inside group. From 17 patients, only semitendinosus graft (ST) was taken, and it was four folded. In the TT group, ST and G autografts from all patients were taken from the same side extremity, and each was folded in itself. While the mean graft diameter was 8±0.7 mm in the TT group, it was 8.2±0.4 mm in the All-inside group. There was no statistically significant difference between the two groups regarding graft thicknesses.

When the clinical results of the patients who were operated on with the all-inside and TT method were compared, there was a superiority in favour of the All-inside technique in the 2nd week postoperatively. Still, no significant difference was found in the 2nd year (**Figure 1**).

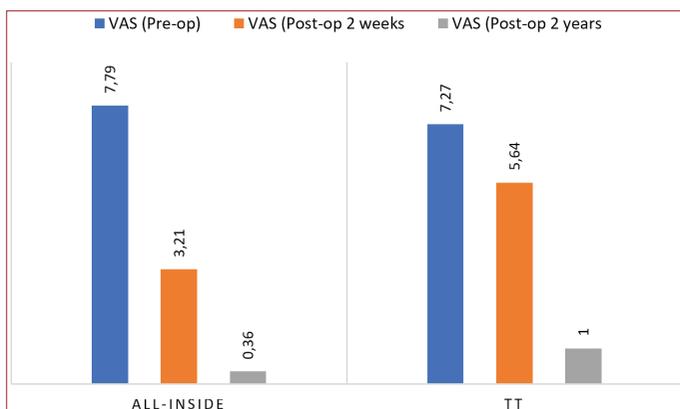


Figure 1. Comparison of pre-op and post-op Visual Analog Scale (VAS) changes in All-inside and TT groups

TI and TT groups found a statistically significant difference regarding the Lachman test in ACL reconstructions at postoperative two years ($p < 0.05$). While the Lachman 1+ rate is high in TT, the Lachman negative rate is high in All-inside.

A KSS, KOOS, Tegner-Lysholm, and IKDC subjective knee evaluations have statistically significant positive results compared to preoperatively in the All-inside and TT groups in ACL reconstructions. However, no statistically significant difference was detected between the groups. Complications are summarised in **Table 2**.

Table 2. Complications

Complications	TT (n)	All-inside (n)
Hypoesthesia	1	0
Graft failure	0	1
Infection	0	1
Tunnel malposition	4	0
Tunnel widening	2	0

DISCUSSION

The TT method has been used for many years in anterior cruciate ligament reconstructions. The all-inside technique is also a technique whose popularity has been increasing among orthopaedic surgeons in recent years. As with many different techniques, it is wondered whether All-inside and TT methods are advantageous or disadvantageous against each other. In this study, we retrospectively compared the results of 45 patients who were operated on with All-inside and TT methods.

In the study by Blackman et al. in 2014, ACL reconstruction was performed with the All-inside method in 95 patients. In the 6th month follow-up of 82 patients, Lachman was negative in 71 patients, and Lachman 1+ was found in 11 patients. Pivot shift was positive in only one patient, while pivot shift was negative in all other patients.^[5] In another retrospective study involving 136 patients, the TT and All-inside methods were compared, and the pivot shift test was negative in all patients in the All-inside group. In contrast,

the pivot shift test was 1+ in 6 (13.6%) patients in the TT group. Lachman test was found to be 1+ in only one patient (1.4%) in the all-inside group, 1+ in 5 patients (11.4%) and 2+ in 1 patient (2.3%) in the TT group.^[6] In our study, 12 patients (52.2%) with negative Lachman in the All-inside group, ten patients with 1+ (43.5%), and one patient with 2+ (4.3%) in the physical examinations performed in the 2nd year postoperatively. In the TT group, there were 3 (13.6%) Lachman-negative patients, 13 patients (59.1%) with 1+, and 6 patients (27.3%) with 2+. In addition, while the pivot shift test was 1+ in 8 patients in the TT group, the pivot shift test was negative in all patients in the TI group, similar to the literature. A statistically significant difference was found in postoperative Lachman findings between the all-inside and TT groups ($p:0.0142$). Postop better anteroposterior stability was observed in the all-inside group. In addition, tunnel malposition was observed in 4 (18.1%) patients in the TT group, while tunnel malposition was not observed in the TI group. We attributed this to the fact that the TI method allows more anatomical femoral and tibial sockets to be opened and that the bone-tendon healing of the graft is better due to the half-tunnel opening. For these reasons, we think that rotational and anterior-posterior laxity is seen less in the TI method, and the method provides a more stable knee restoration.

In our study, the VAS values of the patients at the 2nd week after surgery were 5 ± 3 in the TT group and 4 ± 2 in the All-inside group. A statistically significant difference was found between the postoperative 2nd week VAS values ($p:0.0281$). Postoperative 2nd-year VAS values of the patients were 2 ± 1 in the TT group and 1 ± 2 in the TI group. No statistically significant difference was found in the 2nd year VAS values ($p:0.1472$). In the literature, it has been shown that VAS values are lower in the early period in ACL reconstructions performed with the all-inside technique.^[7,8]

In our study, Tegner-Lysholm activity scale, Knee Society Score (KSS), International Knee Documentation Committee (IKDC), Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaires were taken preoperatively, and in the 2nd year postoperatively from all our patients. Similar to the literature, no statistically significant difference was found between the two groups in the IKDC, KOOS and Tegner-Lysholm scores at the second-year follow-up.^[8-11]

CONCLUSION

Both the transtibial (TT) and all-inside techniques show promising results in anterior cruciate ligament (ACL) reconstructions, providing good clinical outcomes and knee stabilization. The all-inside technique appears to offer certain advantages, such as reduced donor site morbidity, less pain in the early postoperative period, and the preservation of bone reserve for potential revision surgeries. Additionally, the all-inside method allows for more anatomical femoral and tibial sockets, leading to improved functional results.

However, both techniques yielded similar clinical outcomes at the two-year follow-up, with no significant difference observed in patient-based subjective tests. Further research with larger and standardized patient groups is needed to establish a clear superiority between the two methods.

In conclusion, both the transtibial and all-inside techniques are reliable and effective options for ACL reconstruction, and the choice between them may depend on specific patient characteristics and surgeon preferences.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Maltepe University Faculty of Medicine Hospital Ethics Committee (Date: 18.12.2019, Decision No: 2019/900/74).

Informed Consent: Written informed consent was obtained from the patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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