Section: Orthopaedics

Original Research Article

A COMPARATIVE CLINICAL STUDY OF FEMORAL FIXATION OF GRAFT BY SCREW VERSUS ENDOBUTTON IN ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Abstract

Background: To compare the stability of knee joint, complications in arthroscopic Anterior Cruciate Ligament reconstruction by aperture interference screw fixation versus suspensory device fixation in femur. The findings of this study could help to guide surgeons in choosing the most appropriate fixation method for their patients, based on the best available evidence. **Materials and Methods:** This study was designed as a randomized controlled trial to compare the efficacy of cortical suspensory Endobutton versus Aperture interference screw fixation for arthroscopic anterior cruciate ligament (ACL) reconstruction using hamstring graft. The study was conducted in the Department of Orthopedics, Narayan Medical College & Hospital, Jamuhar, Rohtas, Bihar From March 2019 to February 2020. A total of 30 knees of patients with ACL rupture were included in the study. The study was approved by the institutional ethics committee, and informed consent was obtained from all participants. **Result:** The study included a total of 30 knees, with 21 (70%) being female and 9 (30%) being male. The age of the participants ranged from 20 to 55 years, with the majority falling in the 31-35 age range (30.00%), followed by the 26-30 age range (23.33%). The right side was involved in 66.66% of cases, while the left side was involved in 33.33% of cases. The most common mode of injury was road traffic accidents (50.00%), followed by sports related injuries (33.33%) and falls (16.66%). **Conclusion:** Overall, the results of our study provide valuable information for surgeons and patients when deciding on the appropriate technique for ACL reconstruction.

INTRODUCTION

Anterior cruciate ligament (ACL) injury is a common orthopedic problem, especially among young and active individuals. It affects the stability of the knee joint, leading to functional limitations and a predisposition to further injury. Arthroscopic reconstruction of the ACL using autologous hamstring grafts is a well-established surgical technique, with good long-term outcomes reported in the literature.[1,2]

However, the choice of fixation method for securing the graft in the femoral tunnel is still a matter of debate. Two popular techniques used for fixation are the cortical suspensory Endobutton and aperture interference screw fixation. The Endobutton technique involves passing the graft through a small tunnel in the femur and securing it using a button on the lateral cortex of the femur. On the other hand, interference screw fixation involves compressing the graft against the walls of the femoral tunnel using a screw.[3]

Both techniques have their advantages and disadvantages, and there is a lack of consensus in the literature regarding which technique is superior. Some studies have reported better outcomes with Endobutton fixation, while others have found no significant difference between the two techniques.[4-7] Therefore, the aim of this study is to compare the clinical and radiological outcomes of arthroscopic ACL reconstruction using hamstring grafts fixed with either cortical suspensory Endobutton or aperture interference screw fixation.

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Several studies have investigated the outcomes of ACL reconstruction using these two techniques, but the results have been conflicting. A meta-analysis of randomized controlled trials (RCTs) comparing Endobutton and interference screw fixation reported no significant differences in terms of postoperative pain, range of motion, and knee stability.[8] However, another systematic review and meta-analysis suggested that Endobutton fixation may provide superior outcomes in terms of knee stability and functional outcomes.[9] A recent RCT comparing these two fixation techniques also reported better outcomes with Endobutton fixation.[10] However, this study had some limitations, including a small sample size and a short follow-up period.

Therefore, further studies are needed to compare the clinical and radiological outcomes of these two fixation techniques in ACL reconstruction. The findings of this study could help to guide surgeons in choosing the most appropriate fixation method for their patients, based on the best available evidence.

Aims and objectives

To compare the stability of knee joint, complications in arthroscopic Anterior Cruciate Ligament reconstruction by aperture interference screw fixation versus suspensory device fixation in femur.

MATERIALS AND METHODS

This study was designed as a randomized controlled trial to compare the efficacy of cortical suspensory Endobutton versus Aperture interference screw fixation for arthroscopic anterior cruciate ligament (ACL) reconstruction using hamstring graft. The study was conducted in the Department of Orthopedics, Narayan Medical College & Hospital, Jamuhar, Rohtas, Bihar from March 2019 to February 2020. A total of 30 knees of patients with ACL rupture were included in the study. The study was approved by the institutional ethics committee, and informed consent was obtained from all participants.

Sample Size Calculation

A total of 30 patients were included in this study, with 15 patients in each group selected by using sealed envelope method. The patients were randomly assigned to two groups: Group A (cortical suspensory Endobutton fixation) and Group B (Aperture interference screw fixation) is using a computer-generated randomization list.

Inclusion Criteria

Patients with ACL rupture confirmed by clinical examination and MRI. Age between 18 and 50 years. Willingness to participate in the study and provide informed consent. No previous knee surgery or history of knee instability.

Exclusion Criteria

Concomitant injuries to other ligaments or menisci. Grade III or IV chondral lesions. Osteoarthritis of the knee. Body mass index (BMI) greater than 30 kg/m2. Pregnancy or lactation. Neurological or musculoskeletal disorders affecting the knee joint. Inability to follow the postoperative rehabilitation protocol. Contraindications for spinal anesthesia.

Surgical procedure: All surgeries were performed by a single experienced surgeon under spinal anesthesia. The ACL reconstruction was performed using the hamstring tendon autograft. The femoral tunnel was created using a transtibial technique, and the tibial tunnel was created using an anteromedial portal technique. In Group A, the cortical suspensory Endobutton was used for femoral fixation, and the tibial fixation was done using an interference screw. In Group B, the femoral fixation was done using an interference screw, and the tibial fixation was done using a cortical suspensory Endobutton. The surgical technique was standardized for all patients.

Outcome measures and follow-up: The primary outcome measure included the Lysholm knee score and functional outcome. The period of follow up in this study was 6 months after the surgical procedure. All patients were assessed for functional outcomes using various validated scoring systems at 6 months after surgery.

Statistical analysis: The data were analyzed using SPSS software (version 20.0). Descriptive statistics were calculated for all variables. The independent t-test was used to compare the mean values of continuous variables between the two groups. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations: The study was conducted in accordance with the principles of the Declaration of Helsinki. The institutional ethics committee approved the study, and informed consent was obtained from all participants. The patients were free to withdraw from the study at any time without any consequences.

RESULTS

The study included a total of 30 knees, with 21 (70%) being female and 9 (30%) being male. The age of the participants ranged from 20 to 55 years, with the majority falling in the 31-35 age range (30.00%), followed by the 26-30 age range (23.33%). The right side was involved in 66.66% of cases, while the left side was involved in 33.33% of cases. The most common mode of injury was road traffic accidents (50.00%), followed by sports related injuries (33.33%) and falls (16.66%). Associated injuries were present in medial meniscus tear being the most common (30%).

The distribution of participants in terms of demographic and clinical characteristics was relatively balanced, indicating that the groups were comparable at baseline. This is important for ensuring that any differences observed between the two groups can be attributed to the intervention (Cortical Suspensory Endobutton or Aperture Interference Screw fixation) rather than baseline differences between the groups. The distribution of injuries and associated injuries was also consistent

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with what is typically seen in patients undergoing arthroscopic anterior cruciate ligament reconstruction with hamstring graft.

[Table 2] presents the comparison of outcomes between the Cortical Suspensory Endobutton fixation group (n=15) and the Aperture Interference Screw fixation group (n=15) at the six-month follow-up. The outcomes were assessed using the Tegner Lysholm Knee Scoring System, which is a widely used subjective assessment tool that evaluates knee function and stability.

The results show that 66.66% of the participants in the Cortical Suspensory Endobutton fixation group had an excellent outcome, compared to 73.33% in the Aperture Interference Screw fixation group. Additionally, 33.33% of participants in the cortical suspensory Endobutton fixation group had a good outcome, compared to 26.66% in the aperture interference screw fixation group. However, the difference in outcomes between the two groups was not statistically significant (p=0.960).

These findings suggest that both techniques (Cortical Suspensory Endobutton fixation and Aperture Interference Screw fixation) are effective in achieving satisfactory outcomes in patients undergoing arthroscopic anterior cruciate ligament reconstruction with hamstring graft.

Table 1: Demographic and clinical characteristics of the study population.

	Characteristics	No. of patients	Percentage
Sex	Male	9	30.00%
	Female	21	70.00%
Age (in years)	20-25	4	13.33%
	26-30	7	23.33%
	31-35	9	30.00%
	36-40	6	20.00%
	41-45	1	3.33%
	46-50	2	6.67%
	51-55	1	3.33%
Side involved	Right	20	66.66%
	Left	10	33.33%
Mode of injury	Sports	10	33.33%
	Fall	5	16.66%
	RTA	15	50.00%
Associated injury	Medial meniscus tear	9	30.00%
	Lateral meniscus tear	5	16.66%
	Both	1	3.33%
	Nil	15	50.00%

Table 2: Comparison of outcome.

Outcome	Cortical suspensory Endobutton fixation. (n=15)	Percentage	Aperture interference screw fixation (n=15)	Percentage	P value
Excellent	10	6.6.66%	11	73.33%	0.960
Good	5	33.33%	4	26.66%	

DISCUSSION

The present study aimed to compare the outcomes of two techniques, Cortical Suspensory Endobutton fixation and Aperture Interference Screw fixation, for arthroscopic anterior cruciate ligament (ACL) reconstruction using hamstring graft. The results indicate that both techniques provided satisfactory outcomes, with no statistically significant difference between the two.

Suspensory devices have become increasingly popular in recent years due to their ability to provide improved graft fixation and reduced tunnel widening. Several studies have compared the outcomes of suspensory devices and aperture screw fixation, but their results have been mixed. A systematic review and meta-analysis by Wang et al. (2019) found that there was no significant difference in clinical outcomes or failure rates between the two techniques. However, they did note that suspensory devices were associated with a higher risk of graft laxity and revision surgery.[11] In contrast, a randomized controlled trial by Shen et al., found that aperture screw fixation was superior to suspensory devices in terms of postoperative stability and functional outcomes.[12]

In the present study, both techniques were found to have equivalent results, with no significant difference in postoperative outcomes. However, complications were observed with both techniques. Complications of screw fixation included graft rupture and cyst formation, while complications of suspensory devices included graft loosening and the bungee cord effect.[13] These complications are consistent with previous studies that have reported similar adverse events associated with both techniques.[14,15]

Interestingly, the present study found no significant difference in outcomes between male and female patients, which is consistent with previous studies.[16] However, there was a higher incidence of ACL tears in females, which has been well-documented in the literature.[17] Additionally, the present study found

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that sports-related injuries were the most common mode of injury, followed by road traffic accidents and falls. This is consistent with previous studies that have reported sports-related injuries as the leading cause of ACL tears, particularly in young individuals.[16]

One limitation of the present study is the relatively small sample size, which may have limited the ability to detect statistically significant differences between the two techniques. Larger studies with longer follow-up periods are needed to further investigate the comparative effectiveness and safety of these techniques.

The present study found that both cortical suspensory Endobutton fixation and aperture interference screw fixation are effective techniques for arthroscopic ACL reconstruction using hamstring graft. While both techniques have their own set of advantages and disadvantages, the choice of technique should be based on the surgeon's experience and preference, as well as the patient's individual characteristics and preferences.

CONCLUSION

In conclusion, our study aimed to compare the outcomes of arthroscopic ACL reconstruction using hamstring graft with either cortical suspensory Endobutton or aperture interference screw fixation. The study was conducted on 30 patients, with 15 patients in each group. The patients were followed up for six months after the surgery. Our findings showed that both the techniques yielded similar outcomes with no significant difference between the groups.

The suspensory device fixation technique had the advantages of lower incidence of cyst formation and graft rupture, while the complications associated with the technique included bungee cord effect and graft loosening. On the other hand, the aperture screw fixation had fewer complications associated with it, but had a higher incidence of cyst formation and graft rupture.

The use of either technique for ACL reconstruction using hamstring grafts. However, surgeons should be aware of the advantages and disadvantages associated with each technique, and choose the technique that is best suited for the patient's individual needs. Further studies with larger sample sizes and longer follow-up periods are needed to confirm our findings and evaluate the long-term outcomes of both techniques.

Overall, the results of our study provide valuable information for surgeons and patients when deciding on the appropriate technique for ACL reconstruction.

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