



COMPARATIVE STUDY OF FUNCTIONAL OUTCOME OF ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING TIGHT-ROPE VS. ENDOBUTTON AS FEMORAL FIXATION DEVICES.

Orthopaedics

Dr. Biplab Chatterjee	Associate Professor, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Supantha Panja*	DNB resident, Department of Orthopedics, Tata Main Hospital, Jamshedpur. *Corresponding Author
Dr. Divyanshu Kumar	Junior resident, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Bikram Chakraborty	Junior Resident, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Aviroop Chakraborty	Junior Resident, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Avishek Mallick	Junior Resident, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Sanjay Mondal	Junior Resident, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Atanu Kayal	Junior Resident, Department of Orthopedics, Burdwan Medical College & Hospital, Burdwan.
Dr. Partha Shah	MBBS.

ABSTRACT

Objective: The objective of the study was to compare the functional outcome of arthroscopic anterior cruciate ligament reconstruction using quadrupled hamstring graft with bio-screw as tibial fixation device and tight-rope vs. endobutton as femoral fixation devices.

Subjects And Methods: This was a prospective, randomized, open-labelled comparative study. A total of sixty patients were included in the study and were randomly assigned into two groups (each group containing thirty patients).

Group I was treated with tightrope and group II was treated with endobutton. Tightrope is an adjustable suspensory device for femoral fixation used in ACL reconstruction and endobutton is fixed continuous device for femoral fixation. Postoperative follow-up was done at 4 weeks, 8 weeks, 3 months and 6 months.

Results: According to IKDC (international Knee documentation Committee) scoring, around 60%, 33% and 3% were normal, near-normal and poor respectively in both the groups.

Conclusion: This study shows that there is no difference in functional outcome whether tightrope or endobutton was used.

KEYWORDS

Arthroscopic, Anterior Cruciate Ligament, Tibial Fixation Device, Endobutton

INTRODUCTION

Knee injuries are common due to increase in road traffic accidents and involvement in sports. Today, there is an on-going debate among orthopaedic surgeons regarding the optimal treatment for knee injuries.

Anterior cruciate ligament (ACL) injury, usually involves a complete rupture or tear of the ligament. It typically occurs in people involved in risk sports like football and skiing.¹ About 70-84% of ACL injuries are due to non-contact mechanisms such as rapid deceleration in sports.²

Treatment of ACL rupture can be surgical or non-surgical. Surgical management includes ACL reconstruction i.e. damaged ACL is replaced by either autograft (e.g. ligament from person's own body or hamstring tendon) or an allograft (specially treated tendon or ligament from a human cadaver) under arthroscopic surgeon control.³ Both surgical and non-surgical management are often associated with complications such as functional instability, early-onset arthritis and meniscal lesions.^{4,5}

Nowadays, usage of soft tissue grafts is increasing in number as compared to bone-patellar-tendon bone graft. Graft fixation during ACL reconstruction can be achieved with use of fixed loop devices or suspensory adjustable loop devices, metal screws or bio-absorbable screws. Bio-absorbable screws usage provides better visibility in postoperative MRI and also avoids removal at later stage. However, there are controversies regarding the ideal graft, ideal fixation device, ideal time and technique of reconstruction.

The present study was done with the objective to compare the functional outcome of ACL reconstruction using quadrupled hamstring graft with bio-screw as tibial fixation device and tight-rope against endobutton as femoral fixation devices respectively.



Figure 1: Endobutton

Sources: www.googleimages.com/crumb rubber



Figure 1: Arthrex TightRope

Sources: www.googleimages.com/crumb rubber

SUBJECTS AND METHODS

This was a prospective, randomized, open-labelled comparative study. A total of sixty patients were selected in the study and were randomly assigned into two groups (each group containing thirty patients).

Group I was treated with tightrope and group II was treated with endobutton. Study was conducted in department of orthopaedics, Tata Main Hospital, located in Jamshedpur of Jharkhand, India for a period of one year.

Patients with closed growth plate, primary ACL surgery, no evidence of multiple ligament injury, no previous knee surgeries and no ligamentous injury to contralateral knee were included in the study. Patients with additional ligamentous laxity in affected knee, previous ACL surgery of either knee, chronic muscle disorders and with any co-existing local conditions in the form of active articular infection, other inflammatory joint disease, metabolic bone disease and neoplastic disease were excluded.

Routine blood, chest X-ray, ECG was taken and pre-anaesthetic check-up was done. Static and dynamic quadriceps exercise was taught to patients while awaiting surgery.

Sample Size Determination

As per the previous hospital records for the previous year, the average number of patients with anterior cruciate ligament injury were around 5 per month. Considering a data collection period of 1 year, approximately 60 would be included in the study. The final sample size that could be included with the available time and patients will be 60.

Postoperative Follow-up

After surgery, immobilization with knee brace and limb elevation was done immediately. Intravenous antibiotics (Amoxicillin + Clavulanic acid) were given for 3 days. Drain was removed on the 2nd post-operative day, wound inspection was done on 2nd, 5th and 7th post-operative days; sutures were removed on the 12th postoperative day; gradual physical rehabilitation and follow up was done at 4 weeks, 8 weeks, 3 months and 6 months. All patients were evaluated for postoperative outcome by using IKDC scoring.

RESULTS

Table 1 shows the demographic and clinical characteristics of the patients of the two groups. The two groups were comparable ($p < 0.05$). There were thirty patients in each group (Group I and II).

Forty patients presented with injury in the right knee and 20 patients presented with injury in the left knee. Road traffic accident (RTA) was considered as the major mode of injury (46.6%). Medial meniscus injury was involved more than the lateral meniscus.

Postoperative outcomes for both the groups were analysed using IKDC scoring (Table 2).

Table – 1 Demographic And Clinical Characteristics Of The Patients (N=60)

Variables	Number (%)	Percentage
Age (years)		
15-20	3 (5)	5
21-25	16	26.6
26-30	14	23.3
31-35	11	18.3
36-40	6	10
41-45	7	11.6
46-50	2	3.3
51-55	1	1.6
Sex		
Male	51	85
Female	9	15
Side involved		
Right	40	66.6
Left	20	33.3
Mode of injury		
Sports	10	16.6
Fall	22	36.6
RTA	28	46.6
Duration of injury		
<6 weeks	12	20

6-3 weeks	10	17
3-6 months	14	23
6-12 months	14	23
>12 months	10	17
Associated injury		
Medial meniscus tear	13	22
Lateral meniscus tear	3	5
Both	2	3
Nil	42	70

Table – 2 Postoperative Outcome In Both Groups Using IKDC Scoring

IKDC scoring	Group I (Ultrabutton) (n=30) N (%)	Group II (Endobutton) (n=30) N (%)
Normal	19 (63.3)	18 (60)
Near normal	10 (33.3)	11 (36.6)
Abnormal	01 (3.33)	01 (3.33)

Treatment Groups

Sixty patients included in this study were randomly allocated to the treatment group I and treatment group II, using a computer generated randomization list. Group I: Patients were managed with arthroscopic reconstruction by adjustable suspensory device i.e. using quadrupled hamstring graft with bio-screw. Group II: Patients were managed with arthroscopic reconstruction by fixed continuous devices i.e. endobutton as femoral fixation devices.

DISCUSSION

The present study aimed to evaluate the functional outcome of arthroscopic single bundle ACL reconstruction with quadrupled Hamstring graft with trans-tibial and trans-portal techniques using endobutton and tightrope as femoral fixation device and bio-screw as tibial fixation device.

The outcomes according to IKDC scoring system were designated as normal (score: 50-70), near-normal (score: 30-49) and abnormal (score: <30).

The outcome distribution in group I was: normal=19, near-normal=10 and abnormal=01; group II outcome distribution was: normal=18, near-normal=11 and abnormal=01.

In the present study, fall and road traffic accidents predominated as the cause of injury accounting for 37% and 47% respectively. Lewis et al. reported an incidence of 58% meniscal injury associated with ACL tear at presentation, with the medial meniscus involved more than the lateral meniscus and in addition that meniscal repair or resection did not alter the outcome and that chondral lesions are a better predictor of functional outcome.⁶ However in this study 30% of patients had meniscal injury at presentation. Injury to medial meniscus predominated over lateral meniscus injury. None of the patients in this study had significant chondral damage at diagnostic arthroscopy.

The choice of the graft is debatable in the present scenario. Recent developments and advancements in soft tissue fixation devices have proven hamstring grafts to be superior in strength and avoiding extensor mechanism disruption compared to previously used grafts. Wagner et al. recommended hamstring graft even in high level athletes.⁷ Greenberg et al. proposed that allografts is a good choice of graft but it carries the risk of disease transmission.⁸ In our study we used quadrupled hamstring graft in all patients which had greatest ultimate load to failure i.e. 4140N.

The study done by Nabelung et al. reviewed the result of ACL reconstructions with hamstring graft and endobutton in 20 patients.⁹ They noticed 66% had an outcome of normal or near normal using the criteria of the IKDC. The result of this present study corroborates with the similar study conducted by Nabelung et al. In another study by Kong et al., endobutton femoral fixation had better outcome as compared to those of cross pin fixation in hamstring ACL reconstruction.¹⁰ In this study both the techniques employed for ACL reconstruction has been compared but the outcome found to be similar.

CONCLUSION

The findings of the study conclude that there is no difference observed in functional outcome between tightrope and endobutton as graft fixation devices. The success of ACL reconstruction depends more on the correct technique used for the surgery, precise placement of graft

and rehabilitation methods rather than on the type of graft fixation device used, neither tightrope nor endobutton devices. The endobutton has been the de facto standard in graft fixation. But in case of tight-rope the flipping is easy and we are not very concerned with the graft length, with a minimum of 60 mm being sufficient for the procedure as the loop of tight-rope is adjustable. Since the alternate tightrope overcomes some of the potential drawbacks, it should become the de facto standard in the future. The limitation of the study was inadequate sample size and short term follow-up. Future studies with more sample size and length of follow-up are being envisaged.

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