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EVALUATION OF ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION BY PERONEUS LONGUS TENDON AUTOGRAFT

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ABSTRACT

Background: Soft tissue injuries particularly ligaments & tendons, are the most common injuries in sports & often require orthopedic surgery. Among them the Anterior Cruciate Ligament is one of the most injured knee joint structure. The Peroneus longus tendon has been used as a graft in many orthopaedic surgical procedures because of it's comparable biomechanical strength with the native ACL. **Objective:** The aim of this study was to evaluate the functional outcome of Arthroscopic Anterior Cruciate Ligament Reconstruction by Peroneus Longus Tendon Autograft. **Methods:** This prospective interventional study was conducted from July 2019 to June 2021 at Dhaka Medical College Hospital, Dhaka. Within this period, Twenty (20) patients with ACL injury that required reconstruction surgery was selected as per inclusion criteria as a study sample. Pre-operative clinical tests & investigations were done to confirm tear. Reconstruction was done by Peroneus Longus tendon autograft arthroscopically. **Results:** The mean age of patients was 27.35±4.030 with male predominance (90%). Maximum study patients had injured from sports injury (60%). The mean diameter of peroneus longus tendon autograft was 8.25±0.414 mm. Almost all the patients in our study showed significant improvement of their functional capability at 6 months after the surgery with P value <0.05. Pre-operative Lachman test was positive grade 3+ in 70% cases which was improved post operatively and negative in 95% cases, pre-operative anterior drawer test was positive in 100% cases while post operatively at final follow up majority (95%) were negative, Lysholm score improved from 56.85±7.30 to 92.35±6.115, preoperatively which was poor in 85% cases while were good or excellent in 95% cases at final follow-up. The mean for the AOFAS score at final follow up was 96.75±5.711, Majority study patients (95%) had good or excellent AOFAS score on final post-operative assessment. **Conclusion:** After analyzing the results of study, it can be concluded that Arthroscopic ACL reconstruction by peroneus longus tendon autograft is an effective treatment option without compromising ankle function & avoiding potential complications of autografts obtained from knee region.

KEYWORDS:- Ligaments, Tendons, Autografts.

INTRODUCTION

Anterior cruciate ligament is an intra-articular, extra synovial structure that present in the central complex of knee joint. ACL is a band of dense connective tissue, which courses from the femur to the tibia. It runs from anterior aspect of the intercondylar notch to the lateral femoral condyle anteriorly, medially & distally. It has two distinct bundles, the anteromedial bundle that is tight in flexion & the postero-lateral bundle that is tight in extension.[1]

The primary function of ACL is to prevent hyperextension: it's secondary function is to restrain tibial rotation and valgus/varus stress. It functions in concert with all other anatomical structures in the knee joint to control and limit motion and to maintain both static and dynamic equilibrium. It is commonly injured in athletic activities specially contact sports and motor vehicle accidents.[2]

The treatment options for ACL injury are either conservative or surgical. Ideally, a graft used for surgical ACL reconstruction should be one that, as far as possible, recreates the anatomical & biomechanical properties of the native ligament, that guarantees safe fixation, & that provides rapid biological integration, reducing recovery time & donor site morbidity.[3]

To restore the knee stability, ACL reconstruction has been recognized as the most common procedure.

However, up to 4.0% to 15.3% of the operations are failed. According to literatures, a series of factors could influence the outcomes of ACLR surgery including age, sport activities, graft type, initial graft tension, graft diameter & anatomic reconstruction.[4]

The three categories of commonly used grafts are autograft, allograft & synthetic graft. The autografts are usually Hamstring tendons (HS), Bone-patella tendon-bone (BPTB), Peroneus Longus Tendon (PLT). Allografts are varied but can consist of tibialis posterior tendon, Achillies tendon, tibialis anterior tendon, BPTB & peroneus longus tendon. Synthetic grafts have been developed over the years & are currently on their " third generation" e.g. LARS.[5]

Synthetic grafts made of different materials such as carbon fibres, polypropylene, Dacron & polyester have been utilized either as prosthesis or as an augmentation for a biological ACL graft substitute. Allogenic graft results in lower level of stability and higher failure rate.[3]

Shaerf et al. (2014) showed that they compared 47 patients after allograft ACL reconstruction with autograft with 48 months average follow up.[5] They reported IKDC grades A or B in 82.6% of patients with subjective scores of 86.8% which were similar to autograft.

However very little research work has been conducted in our country to observe clinical & functional outcome of ACL reconstruction with Peroneus Longus Tendon autograft. So, considering these facts Current study was designed to evaluate results of Arthroscopic Anterior cruciate ligament Reconstruction by Peroneus Longus Tendon autograft.

OBJECTIVE

General:

General objective:

- To evaluate the outcome of Arthroscopic reconstruction of Anterior Cruciate Ligament by Peroneus Longus tendon autograft

Specific objectives:

- To evaluate clinical improvement regarding ACL stability after surgery
- To determine the patient's functional outcome after surgery
- To find out post-operative complications if any
- To assess the donor site morbidity
- To assess intra-operative peroneus longus tendon graft diameter (mm)

METHODOLOGY

Study design: Short term prospective interventional study

Study period: From July, 2019 to June, 2021 (24 months)

Place of study: Department of Orthopaedic surgery, DMCH, Dhaka, Bangladesh

Study population:

Patients presented with unilateral knee complaints and clinically diagnosed as ACL injury with or without meniscus injury of both sexes in the Orthopaedic outpatient department of Dhaka Medical College Hospital, Dhaka.

Sample size:

Sample size was = 20

Sampling technique:

Purposive sampling (Non-randomized) according to availability of the patients and strictly considering the inclusion and exclusion criteria.

Selection criteria

Inclusion criteria:

1. Age between 18 to 45 years.
2. Both sexes
3. ACL injured patient with or without meniscus injury
4. A normal contralateral knee on clinical examination

Exclusion criteria:

1. Presence of fractures around the knee
2. Patient previously operated for knee injuries
3. Subtotal or total meniscectomy
4. Multiple ligament injury of the knee
5. Loss of knee motion due to acute injury/Stiffness.
6. Presence of osteoarthritis of knee.

Data collection instrument:

The data were collected in a prescribed data collection sheet with a pre-tested structured questionnaire containing history, clinical examination, laboratory investigations, pre-operative and perioperative assessment, perioperative findings and postoperative outcome.

Data collection procedure:

Cases were selected for study from OPD & then admitted to hospital. After counselling for surgical technique then taking consent for thesis enrollment, preoperative data were collected.

Data processing:

All data were compiled and recorded systematically in preformed data collection form and quantitative data were expressed as mean and standard deviation and quantitative data were expressed as frequency distribution and percentage. The analysis of different variable were done according to statistical analysis by using SPSS version 22. For all analysis level of significance was set at 0.05 and p-value <0.05 was considered significant.

RESULTS

The mean age of patients was 27.35±4.030 with male predominance (90%). Maximum study patients had injured from sports injury (60%). The mean diameter of peroneus longus tendon autograft was 8.25±0.414 mm.

Almost all the patients in our study showed significant improvement of their functional capability at 6 months after the surgery with P value <0.05. Pre-operative Lachman test was positive grade 3+ in 70% cases which was improved post operatively and negative in 95% cases, pre-operative anterior drawer test was positive in 100% cases while post operatively at final follow up majority (95%) were negative, Lysholm score improved from 56.85±7.30 to 92.35±6.115, preoperatively which was poor in 85% cases while were good or excellent in 95% cases at final follow-up.

Table I: Distribution of patients by age: (n=20).

Age Group (in year)	Frequency	Percentage (%)
20-25	8	40
26-30	7	35
31-35	4	20
36-40	1	5
Total	20	100
Mean± SD (Range)	27.35±4.030 years (21-36 year)	

Mean age of all patients was 27.35±4.030 years (21-36 year), where in maximum patients belonged to 20-25 years of age (40%).

Table II: Distribution of patients by gender (n=20).

Gender	Frequency	Percentage (%)
Male	18	90
Female	02	10
Total	20	100

Most of the study patients were male (90%).

Table III: Distribution of patients by side of involvement of knee (n=20).

Limb Involved	Frequency	Percentage
Right	12	60
Left	8	40
Total	20	100

Most of the study patients had suffered from injury over right knee joint (60%).

Table IV: Distribution of patients by causes of injury (n=20).

Cause of injury	Frequency	Percentage
Sports	12	60
Traffic accident	6	30
Daily accident	2	10
Total	20	100

Maximum study patients had injured from sports injury (60%), while 30% had injured from traffic accident and rest 10% had injured from daily accident.

Table V: Distribution of patients by duration of injury (n=20).

Duration of sufferings from injury (in months)	Frequency	Percentage
<6	13	65
6-12	5	25
>12	2	10
Mean± SD (Range)	4.85±3.569	

Mean duration of sufferings was 4.85±3.569 months (range: 1.5 -14 months), where in majority study patients had suffered for <6 months (65%). Among rest, 25% suffered for less than 06-12 months, 10% for >12 weeks.

Table VI: Distribution of patients of Intraoperative graft diameter (mm) (n=20).

Graft diameter (mm)	Frequency	Percentage
7.50	2	10
8.00	8	40
8.50	8	40
9.00	2	10
Mean± SD (Range)	8.25±0.414 (7.50-9)	

Mean thickness of intraoperative graft (mm) of all patients was 8.25±0.414 mm (range: 7.50-9 mm). The maximum thickness of the graft was 9 mm & minimum thickness was 7.5 mm

Table VII: Distribution of patients by Post-operative hospital stay (n=20).

Hospital length (in days)	Frequency	Percentage
Up to 3 days	19	95
4-5 days	1	5
Mean± SD (Range)	2.80± 0.70 (2-5)	

Maximum study patients were discharged from hospital within 3 days of surgery

DISCUSSION

A total of 20 cases with isolated ACL injury that required reconstructive surgery were selected as study subjects. In this current study, the analysis of age distribution showed that the age range was 21-39 years & mean age was 27.35 ±4.03, where in maximum patient was belonged in age group 20-25 years (40%). Almost similar finding was observed in the studies of Rhatomy et al., (2019).[6] In their study the mean age was 27.58±8.69. In another study of Rhatomy et al., (2019) showed the mean age was 26.70±8.57 (range 18-45) years.[6] Kerimoglu et al., (2008) showed the mean age was 30 years (range: 21-39 years).[7]

In this current study, Male patients (90%) were more predominant than female (10%). Similar result was shown by Kerimoglu et al., (2008).[7] In their study 93.1.% patients were male and 6.9% were female. Male predominance was also observed in the studies of (Cao et al., 2012; Rhatomy et al., Kumar et al., 2020).[8,9] The reason of male predominance may be due to their more involvement in manual activities, sports and random mobility for work.

In our study we found the cause of injury was sporting activity in 60% cases, 30% was due to road traffic accident and10% was due to daily accident. Rhatomy et al., (2019) revealed that the cause of injury of 69.3% patients was sporting activities.[10] Kerimoglu et al., (2008) suggested that 75% of the study patients suffered the ACL injury as a result of trauma due to sports event.[7]

ACL reconstruction is ideal after subsidence post traumatic inflammatory response. Again, too much delay does not bring good results. So, duration from injury to operation was studied. Mean duration was 4.85±3.569 months. Duration of suffering was <6 months in 65% patients, 6-12 months in 25% patients and >12 months in 10% patients. Almost similar findings observed from various studies from different countries.[11]

Diameter of graft is one of the most important considerations during ACL reconstruction surgery of the knee. Grafts larger than 8mm were found to provide a protective effect in patients aged younger than 20 years.[12] In our study mean of intraoperative peroneus longus graft diameter (mm) was 8.25±0.414 mm (range: 7.50-9 mm). The maximum diameter of the graft was 9 mm & minimum diameter was 7.5 mm. This result indicates that peroneus longus autograft is potential choice for ACL reconstruction and minimizing risks of re-rupture incidence in the future. Similar study of Rhatomy et al., (2019) revealed that mean of intraoperative peroneus longus graft diameter (mm) was 8.38±0.68 mm.[6] The mean thickness of the peroneus longus tendon obtain in the study of Kumar et al., (2020) was 8.74 mm.[9]

For ligamentous stability, pre-operative Lachman test was positive in all patients among them 30% had grade 2+ laxity, patient percentage of grade 3+ was 70%. Post-operative Lachman test results improved significantly, Lachman test was negative in 95% cases and grade 1+ was in 5% cases at 9 months in the present study (P value <0.001). Nearly similar result was found by Kumar et al., (2020) where 88% study patients showed negative Lachman test at postoperative final follow up.[9]

Our study showed that pre-operative anterior drawer test with the foot in neutral position was positive in all of the study patients, while post-operatively after 6 months, majority (n=19, 95%) patients were negative for anterior drawer test (P value <0.001). Angthong et al., (2015) reported, regarding the latest follow-up, anterior drawer tests showed normal findings in 83.3%, while 16.7% of all examined patients had 1+ anterior laxity.[13] Zhao, F., (2019) reported anterior drawer was negative in 80% cases at final follow-up.[14]

Regarding post-operative hospital stay, 95% patient were released within 3 days of surgery. Mean hospital stay

was 2.80 ± 0.70 days. Lysholm, J., 1985 investigated 67 ACL reconstructions and found mean hospital stay was 5 days (range 3 to 8 days).[15]

CONCLUSION

It can be concluded that Arthroscopic Anterior Cruciate Ligament reconstruction by Peroneus Longus tendon autograft is an effective procedure for the treatment of ACL injury.

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