Original Article

Association of Meniscal Injury in Anterior Cruciate Ligament Deficit Knee and Outcome After Surgery

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ABSTRACT

Background: *In young active adult population, the anterior cruciate ligament rupture and meniscus tear are common injuries which reduce the activity level and lead to economic burden.*

Objective: *To evaluate the association of meniscal injury in anterior cruciate ligament deficit knee by diagnostic arthroscopy and assess the clinical outcome after surgery (arthroscopic anterior cruciate ligament reconstruction by ipsilateral quadruple Semitendinosus and Gracilis tendon auto graft and partial menisectomy).*

Methods: *This prospective type of longitudinal study was carried out at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh, from January 2014 to December 2015. Purposive sampling was done to include the patients presented with unilateral knee complaints clinically diagnosed as anterior cruciate ligament deficit with or without meniscus injury. The total number of subjects included was 20. Data collection was carried out with pretested questionnaire. After preoperative evaluation and surgery, accelerated rehabilitation protocol was followed. Follow up had been continued up to six months. In Lysholm Knee scoring scale preoperative and postoperative scores were calculated and comparison of mean value was done.*

Results: *The mean age of respondents was 28.2±9.87 years. Among the respondents, male was found 95%. Regarding the occupation, 60% were sportsmen and 25% were students. The causes of injury were sports (75%), accidental fall (15%) and road traffic accident (10%). Medial and lateral meniscus injury was found in 40% and 45% respondents respectively. The rest were found with anterior cruciate ligament injury alone. The mean postoperative hospital stay was 7.18±4.36 days. According to Lysholm Knee Score, the outcome of surgery was excellent in 60%, good in 35% and fair in 5% respondents. The mean preoperative and postoperative Lysholm Knee Score was 54.64±4.365 and 91±8.768 respectively which reflects significant postoperative improvement ($p<0.05$).*

Conclusion: *Anterior cruciate ligament injury associated with meniscus injury frequently occurs in young population. Reconstruction of the anterior cruciate ligament and partial menisectomy will help people return to their original activity.*

Keywords: *Knee joint, Anterior cruciate ligament, meniscus, arthroscopy, gracilis tendon, meniscus, semitendinosus tendon*

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INTRODUCTION

The knee joint, the largest and complex hinge joint, is one of the most frequently injured joints of the body because of its anatomical position, structure, exposure to external forces and the functional demands placed on it[1]. This is commonly injured in athletic activities and motor vehicle accidents.

Anterior cruciate ligament is an intra-articular, extra synovial structure present in the central complex of knee joint. It functions in concern with all other anatomical structures to control and limit motion and maintain both static and dynamic equilibrium. The ligament provides both anteroposterior and rotatory stability and also helps resisting excessive valgus and varus angulations.

The Anterior Cruciate Ligament is the most frequently injured ligament of the knee joint. The estimated incidence of ACL injury is one in 3000 in general population. On the other hand, incidence of this ligament injury is one in 1750 in people aged between 16 to 45 years[2].

ACL injury varies in severity from a simple sprain to complete rupture. Rupture of the ACL affects knee stability, resulting in giving way symptoms in daily and sports activities. It increases risk of meniscal injuries and early degeneration of the injured knee[3].

Meniscal function is essential to the normal function of the knee joint through providing great elasticity and ability to withstand compression. The meniscus functions as a load-bearing structure[4, 5, 6]. They have been assumed to have shock or energy absorbing functions. The meniscus contributes more to stability of the knee joint in the absence of a functioning ACL[7].

The most common location for injury is the posterior horn of the meniscus and longitudinal tears are the most common type of injury. The other types are transverse and oblique tears, a combination of longitudinal and transverse tears, tears associated with cystic menisci, tears associated with discoid menisci etc.[1].

A meniscal tear requires primary treatment to restore adequate knee function[8]. After nonsurgical treatment of ACL injury, there is often a progressive deterioration of function of the knee joint in athletically active people which leads to repeated instability, meniscal tears, ultimately, degenerative change[9, 10].

ACL rupture is a threat to the homeostasis of the knee. The goals of ACL reconstruction are to abolish the symptoms of instability in the knee joint and to reduce the risk of secondary meniscal tears and chondral damage. Again, most medial meniscal tears usually require meniscectomy or repair[7].

Reconstructions of the anterior cruciate ligament (ACL) are frequently performed procedures in knee surgery now a day. In the United States 50,000 anterior cruciate ligament reconstructions are done annually[11].

In case of meniscal injury secondary restraints or collateral ligaments are often damaged which give rise to joint line tenderness. It has focused the light on considering the utility of arthroscopic examination in all ACL injuries. In case of knee injury diagnostic arthroscopy is a useful tool and is most accessible[12].

Arthroscopy should be considered as a diagnostic aid used in conjunction with a good history, complete physical examination and appropriate radiographs[13].

The main aim of arthroscopic partial meniscectomy is to remove all ruptured and offending tissue and to save as much as functional tissue with a peripheral tissue and relieving pain and improving function of the joint.

Of the injuries attended in the orthopedic hospitals, knee injury is a common one. A good history with particular reference to the nature of injury and a well performed clinical examination will, in most situations, indicate the underlying problems. On clinical ground this approach has been improved by experienced arthroscopy. Arthroscopy has revolutionized the diagnosis as well as management of its intra articular pathology.

The combined ACL rupture and meniscus tear is a common injury in young active adult population which reduces activity level and leads to economic burden[14].

Considering these contexts, this study has been carried out on patients with knee injury with two objectives: firstly, to evaluate the association of meniscal injury in anterior cruciate ligament deficit knee by diagnostic arthroscopy and secondly, to assess the clinical outcome after surgery (arthroscopic anterior cruciate ligament reconstruction by ipsilateral quadruple Semitendinosus and Gracilis tendon auto graft and partial menisectomy).

METHODS

This prospective type of longitudinal study was carried out at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), the largest institution of Bangladesh for managing orthopaedic and traumatized patients, situated in Dhaka metropolitan city. The duration of the study was two years extending from January 2014 to December 2015. Purposive sampling was done. All patients attending outpatient department between 18 to 45 years with Anterior Cruciate Ligament injury were included in the study where the gap between injury and surgery was not more than two years. The exclusion criteria were previously operated patient with any form of knee injury, osteoarthritis of knee, isolated meniscus injury, any injury associated with intra articular fracture of any articular component of knee joint and bilateral Anterior Cruciate Ligament deficiency. The total number of subjects included was 20.

The data collection was carried out with pretested questionnaire. After taking informed written consent, data were collected by face-to-face interview, observation and clinical examination. Clinical diagnosis was confirmed by MRI. After preoperative evaluation and surgery (arthroscopic anterior cruciate ligament reconstruction by ipsilateral quadruple Semitendinosus and Gracilis tendon auto graft and partial menisectomy), accelerated rehabilitation protocol was followed. The phases of follow up included in the protocol are:

1. Immediate phase (0-2 weeks following surgery) – Short period but regular exercise like calf exercise, isometric quadriceps exercise and straight leg raise, passive/active/assisted active knee flexion up to 90-degree, use of pillow under heel, brace for first 2 weeks and partial weight bearing with crutches.
2. Early phase or Maximal Protective phase (2-4 weeks after surgery) –

   Ambulation with normal gait without crutches and full extension at heel strike, full passive knee extension, gradual increase of knee flexion (0-125 degree), straight leg raise, calf stretch and Hamstring stretch.
3. Middle phase (5-12 weeks after surgery) – Full active range of motion, start of athletic activity (swimming, cycling), Hamstring built exercise.
4. Late phase (3-4 months) – Continued Quadriceps and Hamstring built exercise.
5. Up to six months after surgery – Return to sports. If motion is >30-degree, Hamstring strength is >95%, Quadriceps strength is >85%, sports specific training and maintenance of exercise 2-3 times weekly.

According to Lysholm Knee scoring scale preoperative and postoperative (in final follow up at 24 weeks) score was calculated[15].

Comparison of mean preoperative and postoperative value was done to determine whether significant improvement was achievement or not after surgery. On the basis of individual postoperative value, final outcome categorization was done. The study was approved by the Ethical Review Committee of National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh.

RESULTS

The mean age of respondents was 28.2±9.87 years. Most of the respondents were found in 26-30 years age group which was 40% of the study population (Fig. 1). Male was found 95% and female was 5%. Regarding the occupation, 60% respondents were sportsmen and 25% were students. Service holder, businessman and housewife was found to be 5% each. Right knee was found injured in 55% respondents and rest was found in case of left knee representing none with injury of both knee joints. Sports were the causes of injury in 75% respondents. The rest causes were accidental fall (15%) and road traffic accident (10%) (Fig. 2). Medial and lateral meniscus injury was found in 40% and 45% respondents respectively. The rest were found with anterior cruciate ligament injury alone (Fig. 3). Most of the respondents (70%) had to stay in the hospital for 5-10 days during post operative period (Table-I). According to Lysholm Knee Score, the outcome of surgery was excellent in 60%, good in 35% and fair in 5% respondents (Table-II). The mean preoperative Lysholm Knee Score was 54.64±4.365 and postoperative score was 91±8.768. Preoperative versus postoperative Lysholm Knee Scores showed significant improvement ($p<0.05$) (Table-III).

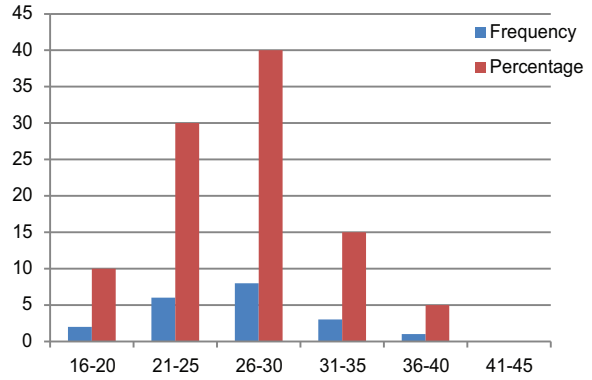

Fig. 1: *Distribution of respondents by age (n=20)*

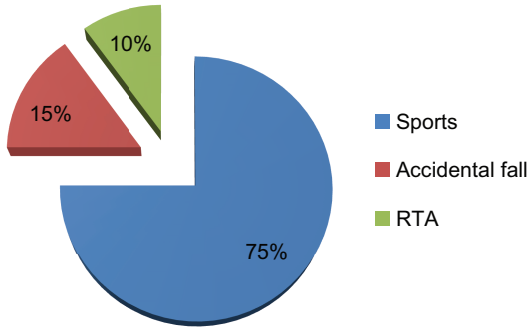

Fig. 2: *Distribution of respondents by cause of injury (n=20)*

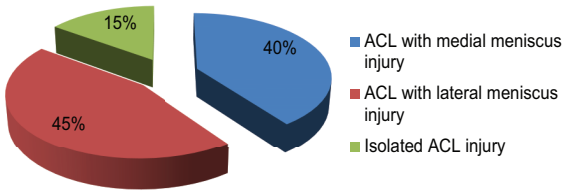

Fig. 3: *Distribution of respondents by associated injury of the knee joint (n=20)*

Table-I: *Distribution of respondents by postoperative hospital stay (n=20)*

Hospital Stay (days)	Frequency	Percentage	Mean±SD
<5	4	20	
5-10	14	70	
10-15	1	5	7.18±4.36
15-20	1	5	
>20	0	0	

Table-II: *Distribution of respondents by Functional Score and outcome according to Lysholm Knee Score scale (n=20)*

Score Range	Outcome	Frequency	Percentage
>94	Excellent	12	60
>84-93	Good	7	35
>64-83	Fair	1	5
<64	Poor	0	0

Table-III: *Comparison of Preoperative and Post operative Lysholm Knee Score*

Period	Mean±SD	p value
Preoperative	54.64±4.365	<0.05
Postoperative	91±8.768	

DISCUSSION

This study evaluated the association of meniscus injury in ACL deficit patients and the result of arthroscopic ACL reconstruction by Quadruple autograft of Semitendinosus and Gracilis and partial menisectomy. The respondents were divided into six age groups. The mean age was found as 28.2±9.87 years. Regarding the sex distribution, male was found 19 which comprised of 95% of study patients. Regarding the occupational distribution, sportsmen were found to be 60% (12) of study population. Among the rest respondents, 25% (05) were students. Right knee was found to be involved in 11 patients which comprised of 55% of the respondents and left knee involvement was found in 09 patients (45%). 15% respondents had ACL injury alone. Study done by Razi et al. on 161 athletes observed that about 16.7% of the study population had ACL tear alone[16]. Regarding the cause of injury, sports injury was found in 15 (75%) of study patients. Next was accidental fall which was found 3 (15%) of the study patients. While distributing the patients according to associated injury, 9 (45%) were found with lateral meniscus injury. Associated medial meniscus injury was found in 08 (40%) respondents and only 3 patients were found with ACL injury alone which was 15% of the study patients. Another study done by Jae-Jeong L. et al. revealed that the incidence of medial meniscal tears was 44% (77/174) and that of lateral meniscal tears was 35% (61/174)[17]. Postoperative hospital stay was mostly 7-10 days in

70% (14/20) of the study patients. Mean hospital stay was 7.18±4.36 days in this study. Uneventful post operative period was found in 85% (17/20) patients. On the other hand, 01 patient each was found with knee pain, superficial infection and knee stiffness which was 5% each.

According to Lysholm knee scoring system, the functional outcome was excellent in 60% (12/20) respondents, good in 35% (07/20) respondents and fair in 05% (01/20) respondents. Preoperative Lysholm knee core was 54.64±4.365 and post operative score was 91±8.768. Preoperative versus postoperative Lysholm knee scores showed significant improvement ($p<0.05$).

Due to time constrain, the study had been carried out with small sample size. Whether the meniscal injury was primary or secondary was not evaluated. Further long-term studies are needed to evaluate the effectiveness of the study.

CONCLUSION

Anterior cruciate ligament injury associated with meniscus injury frequently occurs in young population. Arthroscopic reconstruction of anterior cruciate ligament and partial menisectomy will help them make fit and return to their original activity.

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