ORIGINAL ARTICLE

ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION EXPERIENCE AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the effectiveness of arthroscopic Anterior Cruciate Ligament (ACL) reconstruction surgery

Material &Methods: It is an observational prospective study conducted on 55 patients with worn out anterior cruciate ligament who underwent arthroscopic renovation of this ligament at orthopedic department of Khyber Teaching Hospital Peshawar, Pakistan from January 2018 to June 2019.Patients demographics recorded. Inclusion and exclusion criteria fixed .Pre-op and post-operative assessment done and results recorded.

Results: A total of 122 patients underwent knee arthroscopy. Out of this 67(55%) patients had partially torn meniscus only, 8(7%) patients had combine meniscal tear along with ACL tear while 47(39%) patients had isolated ACL tear only. So, in total 55 patients underwent ACL reconstruction. 54(98%) were male while only 01(02%) was female. Age range was18-45 years with a mean 31.5 years. Only 15(28%) patients had torn ACL on Left side while 40(72%) on Right side. None of the patients had bilateral involvement. 20(36%) patients suffered from ACL tear secondary to a sport injury, 20(36%) due to Road traffic accident (RTA), 15(28%) as a consequence of fall). 49(89%) patient had isolated ACL injury only while, 03(05%) Patients had ACL plus posterolateral corner injury, 01(02%) patient ACL +PCL injury, 02(04%) patients had ACL +MCL. Greater part of the patients' 28 (51%) cases presented with a sensation of giving way of the knee. Pre-operative Lachman test was positive in all the cases (100%). We used hamstring tendon autograft in 52(95%) patients while in only 03(05%) patients we used BPTB graft. Post operatively, Almost 51 (92%) patients became asymptomatic with respect to their pre-op symptomatology and their Lachman test turned to be negative while only 04 (8%) of patients remained symptomatic with positive Lachman test on clinical assessment due to various reasons. Almost 49 (89%) patients regained full range of motion (full extension and full flexion).

Conclusion: Arthroscopic reconstruction of ACL is an effective and reproducible technique with upright functional result.

Key Words. Anterior ,Cruciate, Ligament, Arthroscopic, Knee.

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INTRODUCTION

Anterior cruciate ligament (ACL) is the main inner stabilizing ligament of the knee and its damage causes chief unsteadiness. Anterior cruciate ligament injury more commonly occurs as a result of playing sports produced via ruthless slowing down actions (abrupthalt, spinning, swiftalteration of direction, hopping). Only in a couple of cases, the patient can re-start his/her sports activity but after few hours huge confined edema appears along with joint hemarthrosis secondary to bleeding inside joint due to torn ACL[1]. ACL injuries accounts for a common orthopedic problem, predominantly in young adults. The best recommended treatment option is ACL reconstruction. Bone-patella tendon-bone (BTB) graft or with soft tissues like hamstring tendon autograft are commonly available options for ACL reconstruction to replace damaged and torn ligament[1]. Reconstruction of anterior cruciate ligament Arthroscopically has remained a management of preference for the knees short of this ligament for the reason that non-operative treatment leads to functionally undesirable results [2]. The prevalence of ACL lacking knees secondary to injury is described as 1 in 3,500 people, leading to 95,000 new anterior cruciate ligament tears each year in some of

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the studies[3-5]. The ACL is weaker than PCL and hence it gets torn[6]. The commonest way of ACL tear is that of an unexpected turning or twisting move during sports activity, usually observed in soccer, basketball & rugby. Injuries at work place or Road traffic accidents also lead to ACL tear. Current studies have backedconsiderably to our understanding of the anatomy of ACL facilitating much in its proper reconstruction[7-13].

MATERIAL AND METHODS

This prospective comparative observational study was approved by the ethics committee of the hospital. Informed consent of each patient was obtained. Study related data was collected between January 2018 to June 2019 in Khyber Teaching Hospital Peshawar, Pakisata. Patients with deficient ACL presenting to orthopedic OPD and accident and emergency department underwent arthroscopic ACL reconstruction using hamstring tendon autograft and assessed and monitored for practical result. About 122 patients underwent arthroscopic surgeryof the knee joint. Out of which, 55 patients had their ACL reconstruction surgery done from January 2018 to June 2019. In this prospective, observational study. all the 55 patients were monitored and assessed Patients both the male and female above 18 years of age underwent ACL reconstruction surgery were included. Juvenile skeleton, preceding surgery on either of the knee, H/O co-existing fracture and other noteworthy injuries were excluded. The patient's medical history and assessment findings noted prospectively in a case record form. Detailed medical and radiological assessment was done. The medical evaluation including comprehensive history and clinical assessment including special tests were performed. The patients were asked about duration of symptoms, approach of primary action and restriction of daily life activities. Informed consent taken from the patient. Regular periodic Post op follow up of the patient was done for 6 months. Patient with clinically and radiologically proven torn ACL included in study.In all the patients' special tests comprising of Lachman test (the most sensitive), pivot test (the most specific) for finding of ACL tear 19 were performed 14-16.

The most sensitive test is Lachman and the most specific test is pivot shift for conclusion of ACL rupture17. The most sensitive test Lachman is described either positive or negative. This test is graded as:

Grade I : Kinaesthetic admiration of a positive test

Grade II : Obvious tibia anterior translation

Grade III : submissive subluxation of the tibia in supine position of patient

Grade IV, When the patient able to sublux the proximal tibia due to absent ACL17.

Similarly, The Mcmurray test performed to check the integrity of menisci 15while, varus/valgus stress tests done for continuity of medial and lateral collateral ligaments .Knee joint radiograph taken both pre- and post-operatively. MRI knee joint taken pre-op. Base line lab tests comprising of FBC, HBSAg and Anti-HCV performed. All the patients underwent arthroscopically assisted ACL reconstruction18

Surgical procedure

under spinal anesthesia majority of surgeries performed with tourniquet control in supine position when the knee flexed to 90 degree hanging in leg holder by the side of the OT table.

Stepladder for procedure

Knee Examination under Anesthesia (EUA) including Lachman and pivot shift tests

Diagnostic arthroscopy first only in doubtful cases

Hamstring tendon graft harvest and preparation; An oblique about 3 cm incision used starting 5 cm below the joint line and 1cm medial to tibial tubercle directing posteromedially. Blunt dissectionperformed and Sartorius fascia exposed. Fascia incised in line with hamstring tendons. Distal tendons insertion identified, cut and stay sutures taken into it with vicryl 02. With the help of tendon stripper Gracilis and semitendinosus tendons harvested. Tendons cleared off muscle flesh and quadrupled. A minimum of 10cm length of the quadruple graft was achieved for its secure fixation at both the femur and tibial sides.

Femoral and Tibial Tunnel preparation

Acufex Tibial jig at 55 degrees was fixed with the guidance of arthroscope and guide wire passed in. Exit of the guide wire inside the knee was kept in line with medial tibial intercondylar eminence on the Centre of the tibial foot print which lies just medial to the posterior edge of the anterior horn of lateral meniscus and about 7 mm anterior to the PCL in the midpoint. According to the size of graft prepared tibial tunnel reamed over theguide wire.

For the femoral end, guide wire put in the anatomical site of femoral attachment of the ACL, tapped a bit with hammer and then knee joint kept into hyper flexed position and the guide wire forwarded till it exited at the lateral surface of distal femur. Following this, appropriate size reamer used to make femoral tunnel over the guide wire.

Graft placement and fixation

Through an eyed wire thick vicryl loop passed through the femoral tunnel and with the help of arthroscope through tibial tunnel. 6mm nylon tape used to pass the graft through tibial and then femoral tunnels and fixed in position with interference screws (metallic / bio-absorbable).

Closure

Subcutaneous tissues approximated with vicryl 2 and skin stitched with proline 2/0. A sterilized bandage was applied, tourniquet time noted and tourniquet deflated and. In extension locked position Knee was then supported. Distal vascular status of the operated limb assessed.

Postoperative care

Post-operative I V antibiotics were given for 3 days followed by oral antibiotics for 02 weeks. Wound inspection was done on day 2-3 and then after 02 weeks and stitches were removed also on this visit. Knee immobilizer was applied for the first 6 weeks with intermittent physiotherapy and night time only in subsequent 3-6 weeks..After surgery radiographs of the knees were taken.

RESULTS

A total of 122 patients underwent knee arthroscopy. Out of this 67(55%) patients had partially torn meniscus only, 8(7%) patients had combine meniscal tear along with ACL tear while 47(39%) patients had isolated ACL tear only. So, in total 55 patients underwent ACL reconstruction. 54(98%) were male while only 01(02%) was female. Age range was18-45 years with a mean 31.5 years however, majority of the patient were between 18-30 years of age. Only 15(28%) patients had torn ACL on Left side while remaining on Right side. None of the patients had bilateral involvement (**Table 01**). 20(36%) patients suffered from ACL tear secondary to a sport injury (football or cricket), 20(36%) due to Road traffic accident (RTA) mainly motorcycle, 15(28%) as a consequence of fall (stairs/ in fields etc.) **Table 02**).. 03(05%) Patients had associated posterolateral corner injury, 01(02%) patient Posterior Cruciate ligament (PCL) injury, 02(04%) patients Medial Collateral ligament (MCL) injury while remaining 49(89%) patient had isolated ACL injury only (**Table 03**).

Majority of the patients' 28 (51%) cases complained the sensation of giving way of the knee while doing routine work/sports and protected walking with pain with or without locking. Pre-operative Lachman test was positive in all the cases (100%). In 52(95%) patients we used hamstring quadruple tendon autograft while in only 03(05%) patients we used BPTB graft with a graft diameter 7.5-10 mm with the mean 8.7 mm. Average length of autograft was kept 10 cm.

Post operatively, Almost 51 (92%) patients became asymptomatic with negative Lachman test in 50 (90%) patients, in 01(2%) patient who was asymptomatic clinically but with grade 1-2 positive Lachman test was the one who underwent combined ACL and PCL reconstruction (**Table 04**). Among 04 (08%) patients reasons for failure of arthroscopic ACL reconstruction were as: In 02(04%) patients posterolateral corner injury was missed which was reconstructed later on while in remaining 02(4%) patients graft failed mainly during postop rehab phase might need revision ACL reconstruction surgery (**Table05**). Almost 49 (89%) patients achieved complete range of motion (no flexion contracture i.e. full extension and full flexion).

Table 1: Demographic and clinical characteristics of the ACL injury patients [n=36].

S.No	Characteristics	No & % ages
1.	Male	54 (98%)
2.	Female	01 (2%)
3.	Mean Age (years)	31.5
4.	Rt. sided ACL injury	40 (73%)
5.	Lt. sided ACL injury	15 (27%)
6.	Rt. Sided: Lt. Sided	2.7 : 1

Table 2: Mode of injury leading to ACL rupture.

S.No	Characteristics	No & % ages
1.	RTA	20 (36.36%)
2.	Sports	20 (36.36%)
3.	Falls	15 (27.27%)
	Total	55 (100%)

Table 3: ACL injury along with Associated injuries.

S.No	Types of injury	No & % ages
1.	Isolated ACL	49(%)
2.	ACL + PCL	01(%)
3.	ACL + MCL	02(%)
4.	ACL + PLC	03(%)
	Total	55(100%)

Table 4: Outcome of ACL reconstruction Surgery.

S.No	Lachman's test/Pre-op Symptoms	No & % ages
1.	Negative	50(91%)
2.	Positive	5(9%)
	Total	55(100%)

DISCUSSION

Advancement in arthroscopic skills and development in capability and research have certified ACL reconstruction to become one of the highly fruitful surgical procedure in sports medicine[19, 20]. Anterior cruciate ligament injury is the commonest among all the knee ligaments accounting for up to 200,000 injuries per year in the America [21]. Among the sports soccer, rugby, and skiing have been considered as of major risk and people who do these sporting activities are 10 times addedprone to breach their ACL in comparison to other sporting activities[22]. In spiteof the fact, that ACL reconstruction is the best treatment option for its rupture, but optimal timing of ACL reconstruction remains quite controversial[23]. According to the systemic review by Smith et al there were no differences in clinical results whether ACLR performed within 03 weeks (early) or after 06 weeks(delayed)[24] Similarly Mayr et al considered the cost of timing as well as before surgery knee status on ACL Reconstruction results[25]. The verdict of when to go through ACLR is dependent on multiple variables comprising of before surgery condition of the knee, household, school or work responsibilities, as well as psychological training. However, in advance the ACL is reconstructed the superior is the efficient result because delay in surgery can lead to secondary meniscal and cartilage injury ending up with poorer functional result. Still a lot of research is needed to sort out the answer to the question regards timing of ACLR surgery [26].

The two most frequently used autografts for ACL reconstruction surgery are Bone patellar tendon bone graft (BPTB) and quadrupled tendon hamstring autograft27, 28. In this study we used BPTB auto graft and quadruple hamstring graft Non-absorbable/bio-absorbable fixation on tibial and femoral side respectively[29,30]. 18 to 45 years of patients ranged in this study with mean age of 31.5 years which is somewhat superior than with the mean age (27 years) of Specchiulli et al, Jomha et al (26 years) and Siebold et al mean age (29 years)[31-32]. This may be due to little sample size in the current study. Literature review evidently establishes that bulk of ACL tear happensin the course of sports injuries. Our main criteria for assessment of reconstructed ACL was absence of pre surgery symptomatology comprising of giving way, instability and pain. Moreover, clinical assessment comprising of negative Lachman and anterior drawer test were considered good outcome[17].

CONCLUSION

Arthroscopic reconstruction of ACL is a trustworthy, effective and reproducible technique with fewer complications and upright functional result.

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Following authors have made substantial contributions to the manuscript as under:

Shah SDBA: Idea planning and organization.

Hayat S: Patient care and data analysis.

Khan MA: Patient care.

Muhammad A: Data Collection.

Akhtar W: Assisted in Article Writing.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.