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COMPREHENSIVE CLINICAL EVALUATION OF ANTERIOR CRUCIATE LIGAMENT INJURY: PREOPERATIVE ASSESSMENT TO POSTOPERATIVE OUTCOMES

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ABSTRACT

Introduction: The Anterior Cruciate Ligament (ACL) is pivotal in maintaining knee stability and function, playing a crucial role in the intricate balance of the knee joint. This study navigates through the evolution of ACL understanding, encompassing anatomy, biomechanics, epidemiology, and advancements in surgical techniques. In the contemporary era, heightened sports activity and motorized pursuits contribute to an increased incidence of ACL injuries, making it imperative to explore the preoperative and postoperative facets of clinical evaluation.

Objective: To conduct a comprehensive study assessing both preoperative and postoperative clinical evaluations of patients with anterior cruciate ligament injury.

Materials and Methods: A prospective study was conducted at M R Medical College, affiliated with Basaveshwara Teaching Hospital, Gulbarga, from June 2021- June 2023. Thirty subjects meeting inclusion criteria were included. Preoperative assessments included age, gender, side, and mode of injury. Surgical interventions utilized a variety of graft sources, with a focus on the semitendinosus and gracilis tendons. Postoperative evaluations were conducted at 6 weeks, 3 months, and 6 months, utilizing the Lysholm knee scoring scale for objective and subjective assessments

Results: The study included predominantly male subjects (90%) in the age range of 18 to 40 years. The most common mode of injury was found to be falls (36.7%) and road traffic accidents (33.3%). Preoperative clinical tests (ADT, Lachman, Pivot Shift) demonstrated positive results, while postoperative assessments revealed significant improvement, with all subjects showing negative results.

Conclusion: The study demonstrated substantial postoperative improvement in patients undergoing ACL reconstruction, as evidenced by positive outcomes on clinical assessments and the Lysholm knee scoring scale. The shift from preoperative instability and symptoms to postoperative stability and functional recovery underscores the efficacy of contemporary surgical techniques, particularly those utilizing semitendinosus and gracilis tendons.

Keywords: Anterior Cruciate Ligament, ACL Reconstruction, Clinical Evaluation, Lysholm Knee Scoring Scale, Preoperative Assessment, Postoperative Outcomes.

INTRODUCTION

The Anterior Cruciate Ligament (ACL) is regarded as critical to the normal functioning of the knee. Over the period of past couple of decades, the knowledge of ACL regarding its anatomy, biomechanics, epidemiology, graft sources, fixation methods and clinical outcomes of ACL reconstruction, has increased manifold. Today's modern world of high speed motorbikes and active athletic sports has led to increased ligament injuries of the knee.

The knee joint is the most complex and commonly injured of all joints and the anterior cruciate ligament is the most commonly injured ligament.[1] The anterior cruciate ligament forms the pivot in the functional congruence and stability of the knee in association with the other ligaments, capsule, muscles, and bone.[2,3]

The Anterior Cruciate ligament (ACL) is the primary stabilizer of the knee and prevents the knee against anterior translation.[4] It is also important in counteracting rotational and valgus stress.[5] After ACL injury, most patients experience recurrent episodes of instability, pain, and decreased function.

ACL tears have been termed as the 'First stage of failure of the knee'. Whilst some patients can be managed non- operatively with intense physiotherapy, bracing and modification of activity, severe symptoms may require reconstruction of the injured ligament. ACL reconstruction can now be done consistently and predictably. ACL injuries which were once considered to be career ending, are now a mere blip in an athlete's career path. Surgical Reconstruction commonly allows return to pre-injury levels of performance and delays the occurrence of associated meniscal injury and onset of osteoarthritis.[6]

The incidence of associated cartilage damage, the side effects like joint stiffness, articular surface damage and delayed return to athletic participation, brought to notice the need to develop ACL substitutes with high initial strength and rigid fixation which allowed immediate mobilization and potential early return to athletics. Successful reconstruction of the Anterior Cruciate Ligament has been described by numerous authors worldwide using different types of donor autografts viz. tendons of patella, hamstring or quadriceps and allografts viz. Achilles, patellar, hamstring and tibialis anterior tendons. The common of them is bone-patellar tendon-bone autograft and hamstring tendon autograft. With use of bone-patellar tendon-bone autograft, there are problems with the extensor mechanism of the knee, loss of motion, patella infera, patellar fracture and the development of chronic anterior knee pain.[7]

Anterior Cruciate Ligament reconstruction using semitendinosus and gracilis tendons has been advocated as a standard procedure. Bone-patellar tendon-bone (B-PT-B) surgery has disadvantages such as slow recovery in quadriceps muscle strength, difficulties of full hyperextension, and anterior knee pain. However, some reports comparing the operative outcome of STG and BTB surgeries have indicated preferable results from BTB surgery with regard to knee Stability and sporting activity, others showed no differences in clinical outcome between the two procedures. Recent studies showed an improvement in the outcome of ACL reconstruction using semitendinosus and gracilis tendons.[8,9,10]

With the semitendinosis, using the multiple bundle technique and improved suspensory fixation with the endo-button, has made the graft stronger and stiffer. The endo-button made the procedure endoscopic, and eliminated the need for the second incision. Use of biodegradable interference screw to fix the graft at the tunnel entrance produces a graft construct that is strong, short, and stiff.

OBJECTIVE

To study preoperative and postoperative clinical evaluation of patients with anterior cruciate ligament injury

MATERIALS AND METHODS

The Present Prospective Study was done from the department of Orthopedic at M R Medical College attached Basaveshwara Teaching Hospital Gulbarga from June 2021 to June 2023.

A total of 30 Study subjects during the study period who met the inclusion criteria were included in the study.

Inclusion Criteria
1. Age: 15 to 40 years
2. Isolated ACL injuries
3. Associated with symptoms of instability

Exclusion Criteria
1. Age 40years
2. ACL avulsion fractures and multi ligament injuries
3. Fractures in the ipsilateral or contralateral limb
4. Revision ACL surgery
5. Contralateral ACL injury

All patients coming with symptoms and isolated of ACL tear were Clinical examined immediately before surgery and post operatively at 6wks, 3months, 6months, intervals regarding pain, knee stability, knee range of motions.
After the Operations Jones compression bandage, crepe bandage and ROM knee brace were applied immediately after the operation. Broad spectrum IV antibiotics were given for 2 days and Dressings were done on 2nd, 5th and 10th postoperative days. Patient was encouraged to do partial weight bearing with ROM knee brace 2ndpost operative day onwards (in case of isolated ACL reconstruction). Physiotherapy was taught according to American Association of Orthopaedic Surgery (AAOS) ACL reconstruction post operative rehabilitation protocol.
Objective and subjective evaluation were done with Lysholm knee scoring scale. The Lysholm & Gilquist Knee Scoring Scale comprises of 8 parameters for evaluation. The parameters evaluated were limp, use of support on walking, locking episodes, instability, pain, swelling, stair climbing and squatting. The individual parameters were allotted specific scores depending on the functional ability of the patient. The maximum possible knee score was 100 points. Based on the outcome of scores, they were divided into Excellent, Good, Fair and Poor. Excellent: 91 – 100 points Good : 84 – 90 points Poor :64 or fewer points
SPSS software version 21.0 was used. The Chi-square analysis wasused for comparing the sex distribution, mode of injury, MRI grading of ACL teartests for ligament laxity at 6 months and the Lysholm knee scores of the two groups. Independent t test was used to compare the age distribution and knee ROM of patients in both the groups. A P value of < 0.05 was considered statistically significant for all tests.

RESULTS
In the present study a total of 30 study subjects were enrolled and analyzed.

		Frequency	percentage
Age Group	18-25	9	30
	26-30	7	23.3
	31-35	11	36.7
	36-40	3	10
Gender	Male	27	90
	Female	3	30
Side of Injury	Left	15	50
	Right	15	50
Mode of Injury	Fall	11	36.7
	RTA	10	33.3
	Sports	9	30

Table 1: Socio Demographic Profile among the study subjects

The youngest patient was 18 yrs and the oldest patient was 40 yrs old. The maximum number of patients were in the age group 31-35 yrs (36.7%) followed by age group 18-25yrs (30%). In our series of 30 patients. 27 patients (90%) were males and 3 patients (10%) female. (Male Predominance).It may be because of involvement of males in outdoor activities like sports, farming and RTA. Right knee was injured in 15 patients (50%) and left knee was injured in 15 patients (50%). Most ACL tears were caused by fall (36.7%) and road traffic accidents (33.33%).Next common cause injury is sports activities like slip and fall while walking/climbing down stairs. Twisting of knee noted in most of the patients followed by twisting in flexion.

		ADT	
		Positive	Negative
ADT	Pre OP	30 (100%)	0 (0%)
	Post OP	0(0%)	30 (100%)
Lachman	Pre OP	30 (100%)	0 (0%)
	Post OP	0(0%)	30 (100%)
PIVOT SHIFT	Pre OP	8 (26.6%)	22 (73.4%)
	Post OP	0(0%)	30 (100%)

Table 2: Comparison of ADT, Lachman, Pivot pre and Post OP among study subjects

In the present study ADT and Lachman test was found to be positive in pre op among all the subjects and Negative in post op among all the study subjects. In the Pivot Shift test in pre op 26.6% were Positive and 73.4% of them were negative and in Post op all were negative.

		LYSHOLM	
		Frequency	**Percentage**
LYSHOLM Pre op	Poor (<65)	29	96.7
	Fair (65-83)	1	3.3
	Good (84-90)	0	0
	Excellent (>90)	0	0
LYSHOLM Post op	Poor (<65)	0	0
	Fair (65-83)	1	3.3
	Good (84-90)	9	30
	Excellent (>90)	20	66.7

Table 3: Distribution of pre and post op LYSHOLM Score among study subjects

In the present study in the pre op LYSHOLM Score nearly 96.7% of them were regarded as poor, 3.6% were fair and in Post op Score 66.7% of them were graded excellent, 30% of them were good and 3.3% were fair.

Comparison	**Mean ± SD**	**Paired T test**	**P Value**
LYSHOM Pre Op	38.3±9.8	3.67	0.001
LYSHOM Post Op	92.1±3.7		

Table 4: Comparison of LYSHOLM Pre-op and Post-OP

On comparing the Mean LYSHOM Score in Pre and Post op it was found to be Statistically significant.

In our study out of 30 patients 3 patients (10%) had pain at the graft site at the end of 6 months. Early superfecial infection of the site was present in 2 cases (6.67%) which delayed wound healing and secondary suturing done later with oral antibiotic coverage. There was no deep infection. Majority of

patients (30%) were having grade 1 laxity at the end of 6 months but with hard end point.1 patient had FFD due to noncompliant physiotherapy.1 patient complaint of click but no instability.

DISCUSSION

The anterior cruciate ligament serves an important stabilizing and biomechanical function for the knee. Reconstruction of the ACL remains one of the most commonly performed procedures in the field of sports medicine. The advantages of arthroscopically assisted reconstruction of the anterior cruciate ligament are that there is minimum injury to the synovial membrane of the joint and yet it achieves the goals accomplished by open operative technique. The theoretical advantage of arthroscopic surgery includes less injury to patellofemoral mechanism and possibly less frequent symptoms and contractures of the patellofemoral joint post-operatively. The proper site for location of bone tunnels can be better identified by an arthroscope. Several factors have been identified as significantly influencing the biomechanical characteristics and the functional outcome of an ACL re-constructed knee joint. These factors are: (1) individual choice of autologous graft material using either patellar tendon-bone grafts or quadrupled hamstring tendon grafts, (2) anatomical bone tunnel placement within the footprints of the native ACL, (3) adequate substitute tension after cyclic graft preconditioning, and (4) graft fixation close to the joint line using biodegradable graft fixation materials that provide an initial fixation strength exceeding those loads commonly expected during rehabilitation.

9 out of 30 patients (30%) were less than 25 yrs; eighteen patients (60%) in the age group 26-35 years and three patients (10%) in the age group 36-40 years. This data shows that ACL injury is more common in young adults.

Male predominance was found in our study. There were twenty seven males and three females. This probably is because males are more frequently involved in sports and road traffic accidents.

Left knee was affected in 15 patients and right knee in 15 patients. This implies that there was not much difference in lateralization of the injury.

The mode of injury was road traffic accident in 10(33.33%) patients; nine (30%) patients had injury during sporting activities like cricket, kabaddi, football, badminton. Eleven (37%) patients had other causes which included twisting injury of knee due to slip and fall at home, work place.

Buchner M, Schmeer T, Schmitt H[11] in their clinical study evaluated clinical, functional, radiological and isometric results after arthroscopic reconstruction of ACL. Seventy operated patients with an average age of 34.3 years could be clinically examined at a mean follow-up time of 6 years. The preoperative activity level could be maintained in 71% of the patients. The Lysholm score showed ‘excellent’ and ‘good’ results in total 85% patients; with a mean score of 83.6%.

As of Lysholm and Gilquist Knee Scoring, we compared our results to the results of Lysholm and Gilquist in 1997. They had studied 60 cases totally and had excellent and good results in 88%. They had 8 % with fair results and 4% poor outcomes. 76 In our study, average Lysholm score was 95.76 at mean follow up period of 12 months. The Lysholm score showed ‘excellent’ results in 27 patients (90%) and ‘good’ results in 3 patients (10%). No patient had either ‘fair’ or ‘poor’ result.[12]

CONCLUSION

80% of the patients graded their post operative recovery as normal and 20% as near normal and whereas no patients graded as abnormal according to IKDC score .Pre and post operative scoring using IKDC and Lysholm scores reveals significant improvement in patient functional and daily activities after surgery with statistically significant p-value.

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