Section: Orthopaedics

Original Research Article

PROSPECTIVE STUDY OF FUNCTIONAL OUTCOME OF ARTHROSCOPIC RECONSTRUCTION OF ANTERIOR CRUCIATE LIGAMENT ALONG WITH OTHER LIGAMENT INJURIES

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ABSTRACT

Background: To study the functional outcome of arthroscopic reconstruction of anterior cruciate ligament along with other ligament injuries.

Materials and Methods: The prospective present study was conducted at Government Medical College, Jangaon Telangana. During the period of August 2024 to June 2025. All the patients were selected into the study based on inclusion and exclusion criteria. . The fixation of the graft is achieved with cannulated interference screws and staples. All the patients were follow-up periodically 3 months and 6 months.

Results: In the present study, a total number of 10 patients underwent anterior cruciate ligament reconstruction with other ligament injuries. All patients were males. All the patients were kept on a standard postoperative rehabilitation protocol. Outcome was measured using Lysholm knee score, Range of motion of the knee joint and Quadriceps power of ipsilateral knee. Average Lysholm score was 88.3.Full range of motion attained in 10% of patients at 6 months, 70% of patients has 10 degree decrease in movement.20% of patients had 20 degree loss of movement. Quadriceps power was 4/5 MRC GRADE in 10% of patients And 5/5 power MRC GRADE in 90% of patients.

Conclusion: The present study concluded that, uncertainty exists in the recommendation of optimal treatment for multi- ligament injury with ACL injury. Only 10 cases of ACL with associated ligament injuries were followed. Long term studies with more subjects will properly define the indication for the different treatment options. Hence multicentric trials can overcome this, to define the best treatment option for avulsion injuries.

Keywords: Anterior cruciate ligament, Orthoscopic Reconstruction, MRC Grade, Lysholm score.

INTRODUCTION

Knee ligaments often are injured in athletic activities, especially those involving contact, such as football, gymnastics, and other sports also can produce enough sudden stress to disrupt knee ligaments. Motor vehicle accidents, especially those involving motorcycles are common causes of knee ligament disruptions (e.g.,a passenger's flexed knee strikes the automobile dashboard on impact, tearing the posterior cruciate ligament). Ligament disruption can occur without a fall or direct contact when sudden, severe loading or tension is placed on the ligaments, such as when a running athlete plants a foot to suddenly decelerate or change directions.[1-5]

The concept of multiligament knee injuries comprises a wide range of ligament and intra-articular injury patterns. These complicated injuries necessitate a methodical approach to evaluation and treatment. Management strategies for these multifaceted injuries attempt to balance the restoration of stability with maintenance of function through the mergence of operative and nonoperative means. The operative methods include repair, repair

plus augmentation, or reconstruction of injured structures combined with bracing and rehabilitation in the short term. The ultimate goal of treatment is to return the patient to pre-injury employment or activity with the hope of delaying post-traumatic arthritis. The purpose of the study is to 1) identify the reported incidence of these relatively infrequent injuries, and 2) propose a surgical treatment algorithm 3) Assess functional outcome. For the purposes of this proposed treatment algorithm, the four major ligamentous stabilizers of the knee will be the anterior cruciate ligament (ACL), the posterior cruciate ligament (PCL), the medial collateral ligament (MCL), and the lateral collateral ligament (LCL).This study was done to find a treatment algorithm for ACL based other ligament injury reconstructions.

Aim of the Study

Aim: to study the functional outcome of arthroscopic reconstruction of anterior cruciate ligament along with other ligament injuries

Objectives: Evaluate the functional outcome of patients with knee joint ligament injuries post arthroscopic reconstruction.

Mechanism of Injury; Four mechanisms have been described as capable of disrupting the ligamentous structures around the knee: (1) abduction, flexion, and internal rotation of the femur on the tibia; (2) adduction, flexion, and external rotation of the femur onthe tibia; (3) hyperextension; and (4) anteroposterior displacement. This is most common with the anterior cruciate ligament. Mechanisms reported as possibly able to disrupt the anterior cruciate ligament with minimal injury of other supporting structures are hyperextension, marked internal rotation of the tibia on the femur, and pure deceleration. Isolated posterior cruciate disruption can result from a direct blow to the front of the tibia with the knee flexed

Clinical Evaluation

I) Physical Examination:

i) Special tests

- VARUS / VALGUS STRESS TEST:
- POSTERIOR SAG TEST:
- QUADRICEPS ACTIVE TEST
- POSTERIOR DRAWER TEST:

IKDC -Grading of joint translation

Normal	Nearly normal	Abnormal	Severely abnormal
0-2mm	3-5mm	6-10mm	>10mm

- DIAL TEST
- LACHMAN TEST

Grading of the test

0 Normal laxity

1+ anterior translation of less than 0.5 cm

2+ anterior translation of 0.5-1 cm

3+ anterior translation of 1-1.5 cm

4+ anterior translation more than 1.5cm

In patients with large thigh, if the examiners hand cannot encompass 50% of the thigh, the test is not reliable. In this situation, the examiner uses his thigh as a bench for performing the test. One hand stabilizes the patient's femur on the examiners thigh while the other hand applies the stress. Small degrees of anterior translation of the tibia on the femur may be better detected in a relatively extended position, where the door stopper effect of the posterior horn of the meniscus is obliterated.

Anterior Drawer Test: It is carried out with the patient supine, hip flexed to 45 degrees and the knee flexed to 90 degrees with the foot on the table top. The examiner sits on the dorsum of the foot to stabilize it and places both the hand behind the knee to feel for the relaxation of the hamstrings. The proximal part of the leg is then pushed anteriorly and posteriorly gently to note the movement of the tibia on the femur with foot in neutral position33.

Slocum Rotatory Anterior Drawer Test: IMAGING STUDIES B] Magnetic resonance imaging: MRI is now considered as a gold standard, non-invasive imaging modality for assessing the ligamentous injuries of the knee. It clearly defines the specific site of ligamentous injury -proximal, distal or mid- substance. It also shows the location of bone oedema and the cartilaginous state which may be helpful in ascertaining the prognosis. They provide only static images and so may not be able to determine the function of the knee. It is also unreliable in evaluation of chronic injuries. Cruciate ligament injuries are classified into intrasubstance tear, partial tear or complete tear and avulsion fracture. Intrasubstance tear shows oedema and haemorrhage within the ligament. Partial tears show interruption of one of the margins of the ligament. Complete tears show loss of continuity of the ligament and increased signal at the margin of the tear. Assess the medial structures for any signal changes and their location which is indicative of oedema and haemorrhage. The continuity of superficial MCL, deep MCL and posterior oblique ligament are assessed. This should be correlated with clinical findings. Then assess the lateral and posterolateral structures of the knee [LCL, biceps femoris, iliotibial band, popliteus complex and capsular structures]

Meniscus is then completely assessed for any tear or root avulsions.

MATERIALS AND METHODS

Type of Study: Prospective study.

Site of Study: Government Hospital, Janagaon.

Duration of Study: August 2024-June 2025

Pre-Operative Evaluation: In acute presentation after hemodynamic stabilization patients were subjected to the following:

- Detailed clinical evaluation including history and physical examination

- Radiographs of the knee - anteroposterior and lateral views
- CT scan of the knee with 3D reconstruction
- MRI of the knee joint
- For ligamentous injuries arthroscopic single bundle reconstruction was preferred. The choice of graft used was semitendinosus and gracilis.

Implants & Instrumentation:

- Non- absorbable sutures Ethibond No.2
- Standard 4mm 30°arthroscope with camera and light settings.
- Pneumatic tourniquet
- Interference screws
- Spiked ligament staples
- ACL button

Inclusion Criteria

- All cases with isolated knee joint ligament injuries including anterior cruciate ligament injury are included in the study irrespective of the mode of injury/duration/mechanism of injury.
- Clinically Lachman test positive.
- Anterior drawers test positive.
- Posterior drawer test positive.
- Valgus varus test positive.
- MRI diagnosed ligament injuries are included in the test.

Exclusion Criteria

- Cases with isolated ACL injury.
- Patients with bony ACL avulsion.
- Other associated fractures.
- Cases with revision ACL reconstructions.

Management

Operative Management: A centrifugal approach was taken to reconstruct the ligaments. In all cases intraarticular ligaments were reconstructed first followed by a repair of meniscal tear if any.The collateral ligaments were reconstrcuted after intrarticular ligaments in either same or different setting. This study included anterior cruciate ligament as the primary ligament injury and was reconstructed first.

POSTOPERATIVE PROTOCOL:

Phase I (0-8 weeks)	Non weight bearing x 3-4weeks Partial weight bearing at 4thweek Brace in full extension 24/7 x 3-4 weeks Passive ROM started at 4thweek Patella mobilization Quadriceps sets/ SLR with brace Isometric abdominal exercises
Phase II (8-16weeks)	Closed chain strengthening 0-60° Stationary bike for ROM without resistance No open chain or isolated hamstring strengthening Balance and proprioceptive training (single leg) Active knee flexion upto 110°
Phase III (4-8months)	Closed chain quadriceps exercises with increase resistance Isolated hamstring exercises after 6th month. Progressive hip, core and proprioceptive training. Plyometric and agility exercises between months 6 and 7.
Phase IV (9months to 1year)	Continuation of strengthening Sport specific drills at 50% intensity

Follow-UP: Patients were followed at 3 months and 6months. Each time during the visit patients were subjected to the following:

- Clinical evaluation: Look for any tenderness around the knee. Any abnormal swelling and surgical wound site discharge must be noted.
- Functional ability of the patient [from history and scoring system].
- Radiographic assessment: Antero-posterior and lateral views of the knee are taken. Look for any screw loosening, step- off of the fragments from the fracture bed and loosening of interference screw in patients who underwent ligament reconstruction.

Functional Assessment After Surgery Lysholm Knee Scoring Scale

1. LIMP -I have no limp when I walk -I have a slight or periodical limp when I walk -I have a severe and constant limp when I walk	 5 3 0
2. USING CANE /CRUTCHES -I do not use cane or crutches -I use cane or crutches with some weight bearing -Putting weight on my hurt leg is impossible	 5 2 0
3. LOCKING SENSATION IN THE KNEE	
-I have no locking and no catching sensations in my knee	15
-I have catching sensation but no locking sensation in my knee	10
-My knee locks occasionally	6
-My knee locks frequently	2
-My knee feels locked at this moment	0
4. GIVING WAY SENSATION FROM THE KNEE	
-My knee never gives way	25
-My knee rarely gives way, only during athletics or other vigorous activities	20
-My knee frequently gives way during athletics or other vigorous activities, in turn I am unable to participate in these activities	15
-My knee occasionally gives way during daily activities	10
-My knee often gives way during daily activities	5
-My knee gives way every step I take	0
5. PAIN	

-I have no pain in my knee	25
-I have intermittent or slight pain in my knee during vigorous activities	20
-I have marked pain in my knee during vigorous activities	15
-I have marked pain in my knee during or after walking more than 1mile	10

RESULTS

Table 1: Age Incidence and Distribution

Age group	No. of patients
<20	0
20-30	6
30-40	2
>40	2

AGE: Most of the patients in the study were aged 20-30years (60%) 20% patients were aged 30-40
20% of patients were aged 40+

ASSOCIATED MENISCAL INJURIES

- Of the 10 patients in our study 6 had meniscal injuries
- Of them 1(10%) patient had isolated lateral meniscal tear
- 3 (30%) patients had isolated medial meniscal tear
- 2 (20%)patients had both medial and lateral meniscal tear.
- Meniscal injuries were repaired using "inside out" technique

Table 2: Associated Meniscal Injuries

Meniscal injuries	No. Of patients
Present	6
Absent	4
Isolated lateral meniscal injuries	1
Isolated medial meniscal injuries	3
Both meniscal injuries	2

OTHER LIGAMENT RECONSTRUCTION APART FROM ACL

The most common ligament injury associated with anterior cruciate ligament was posterior cruciate ligament 7 patients (70%). Medial collateral ligament injury was seen in 2 patients (20%). Lateral collateral ligament injury was seen in 1 patient (10%). A centrifugal approachwastakenfor there construction of the ligaments All intra articular ligaments were approached and reconstructed, and extra articular ligaments were reconstructed later either in same setting or a different setting

Table 3: Ligament Reconstruction

LIGAMENT RECONSTRUCTION	NO. OF PATIENTS
MEDIAL COLLATERAL LIGAMENT	2
LATERAL COLLATERAL LIGAMENT	1
POSTERIOR CRUCIATE LIGAMENT	7

LYSHOLM'S SCORE

In our study Lysholm score was done at 3 months an 6 months. Average Lysholm score for the patients at 3 months was 79.2 and at 6 months was 88.30. At 3 months follow up 8 patients (80%) had a fair lysholm's score And 2 patients (20%) had good lysholm's score. After good physiotherapy and proper compliance of rehabilitation protocol at 6 months follow up 9 patients(90%) of patients had excellent lysholm's score and 1 patient(10%) had excellent lysholm's score and 9 patients had good lysholm's score

RANGE OF MOVEMENTS:

- In this study of 10 patients,
- At 3 months follow up, 6 patients had >20 degree of decrease in range of movements at
- 4 patients had 10 degree of decrease in range of movement.
- At 6 months follow up,
- 1 patient had normal range of motion of the operated knee.
- 7 patients had upto 10 degree of decrease in range of movements.
- 2 patients had 20 degree decrease in range of movements.
- It was noted that both patients who had 20 degree decrease in range of movements had meniscal injury

Table 4: 3 Months Follow Up

Decreased rom	No of patients
Full range of movements	0
10 degree loss	4

>20deree	6

Table 5: 6 Months Follow Up

Decreased Rom	No Of Patients
No Decreased ROM	1(10.00%)
Upto 10 degree	7(70.00%)
>20 degree	2(20.00%)

QUADRICEPS POWER (MRC GRADE):
At three months follow up 3 patients had 4/5 mrc grade qudriceps power at six months of follow up 9 patients (90%) had grade of 5/5 (MRC) power in Quadriceps muscle. One patient has 4/5 power due to poor rehabilitation compliance. This shows that there was significant Quadriceps muscle strength at long term follow-up with good rehabilitation program.

Table 6: 3 Months Follow Up

GRADE	NO. OF PATIENTS
4/5	3(30.00%)
5/5	7 (70.00%)

Table 7: 6 MONTHS FOLLOW UP

GRADE	NO. OF PATIENTS
4/5	1(10%)
5/5	9(90%)

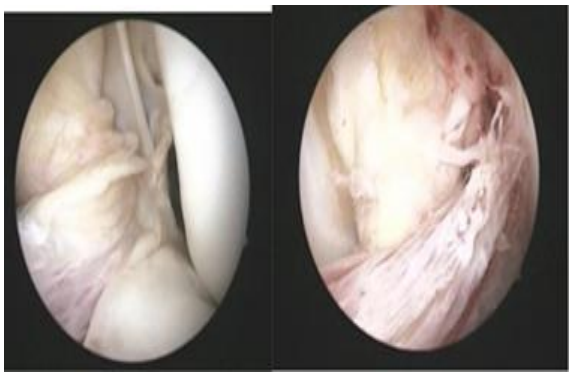
COMPLICATIONS: Only three of the cases had anterior knee pain for which NSAIDS were given.none of the patients had infection or extensor lag.

Table 8: Complications

COMPLICATIONS	NO. OF CASES
Anterior knee pain	03
Infection	00

PreopX-ray

PostopX-ray:



Arthroscopic pictures showing ACL tear & ACLR

Followup photograph showing full flexion & active SLR with no extensorlag

DISCUSSION

Arthroscopic reconstruction of the injured ACL has become the gold standard and is one of the most common procedures done in orthopaedics and thus it has been extensively studied and outcomes of ACL reconstruction have gained considerable attention.[6-10] The choice of graft is a topic of great debate in ACL injury. 'Only 10 cases of acl with associated ligament injuries were followed. A small sample size due to covid19 pandemic makes it difficult to draw definitive conclusions regarding definite treatment. Long term studies with more subjects will properly define the indication for the different treatment options. Hence multicentric trials can overcome this, recent years. The various options include bone patellar tendon bone graft, hamstring auto- graft, quadriceps tendon, various synthetic grafts and allograft but the hamstring graft has been increasingly used in recent. Our study is to evaluate the functional outcome of arthroscopic anatomical single bundle ACL reconstruction using hamstring autograft versus quadriceps tendon graft. This prospective study was conducted in Government Medical College and Hospital, Janagaon to clinically evaluate the clinical results of arthroscopic ACL reconstruction. This study group comprised of 10 patients with follow up. In the present study, a total number of 10 patients underwent anterior cruciate ligament reconstruction with other ligament injuries. All patients were males. All the patients were kept on a standard postoperative rehabilitation protocol. Outcome was measured using Lysholm knee score, Range of motion of the knee joint and Quadriceps power of ipsilateral knee.

CONCLUSION

However, uncertainty exists in the recommendation of optimal treatment for multi- ligament injury with to define the best treatment option for avulsion injuries.

Conflict of Interest: None
Funding Support: Nil

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