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Clinical outcome in patients with posterolateral corner injuries of the knee with la prade technique

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Abstract

Introduction: Injuries to the posterolateral structures of the knee are commonly caused by sports injuries, falls, and vehicle accidents. A direct hit on the proximal tibia when the knee is in stretched condition may cause an isolated posterolateral injury. The PLC is primarily responsible for resisting varus angulation and external rotation in addition to posterior displacement of the tibia. It is extremely important that the functionality of the PLC and tibiofibular joint be checked along with other clinical tests when diagnosing a knee injury. Aim of the study is to know the clinical outcome of La Prade technique for posterolateral corner injury of the knee.

Materials and Methods: A total of 20 patients were included in this study with posterolateral corner injury and were operated by La Prade technique.

Results: In this study, the preoperative range of motion was measured with goniometer. Normal range of motion (0-140°) was seen in 8 patients (40%), 6 patients (30%) had good range of motion (0-120°). 2 patients (10%) had range of motion (0-110°), 2 patients (10%) had range of motion (0-100°), 2 patients (10%) had (0-90°) range of motion. Post operatively 15 patients (75%) had full range of motion (0-140°). 1 patient (5%) had (0-130°) range of motion, and 4 patients (20%) had range of motion (0-120°).

Conclusion: The posterolateral knee reconstruction technique or La Prade technique presented here significantly improved objective stability in patients with a chronic posterolateral knee injury.

Keywords: La Prade technique, posterolateral corner injury, knee injury, range of motion

Introduction

The knee joint is the largest synovial joint in the body. It is a modified hinge joint. It is a tri-axial joint consisting of three articulations, patella-femoral, medial tibio-femoral and lateral tibio-femoral joint. It is characterized by presence of menisci because of which it is called as complex joint, which compensates for the incongruity of the articular surfaces. These compound and complex features of the joint account for the complexity of the knee joint movements. The Postero-Lateral Corner (PLC) is often called the "dark side" of the knee due to its complexity and the minimal amount of research performed to better understand its anatomy and biomechanics. The PLC consists of soft tissue structures that are divided into static and dynamic stabilizers. The static stabilizers include the posterolateral capsule, LCL, PFL and fabellofibular ligament. These three soft tissue structures stabilize the PLC at varying degrees of flexion and extension by resisting varus gapping in combination with external rotation at the knee joint. The dynamic stabilizers are the biceps femoris, iliotibial band (ITB), and popliteus complex. Though not located in the posterolateral aspect of the knee, the Anterior Cruciate Ligament (ACL) and Posterior Cruciate Ligament (PCL) act as secondary stabilizer that resists internal and external rotation. The combinations of all the primary and secondary structures help to stabilize the posterolateral corner of the knee. Internal rotation about the knee has also been investigated but research has shown that a compromised PLC has little effect in terms of this area of concern. The FCL, PLT, and PFL will be the primary focus of concern when analyzing the biomechanics of the PLC for this study. In 1997, La Prade and Terry and Krukhaug *et al.* reported that in patients with posterolateral knee injuries, including combined injuries, peroneal nerve injuries were observed in 13% of 71 patients and in 16% of 25 patients, respectively ^[1, 2]. Patients with chronic injuries complain of broad pain such as medial joint line pain, lateral joint line pain, and posterolateral pain. In 2010, La Prade *et al.*

demonstrated an anatomic PLC reconstruction technique in 2004 and reported outcomes of a cohort group afterwards: the patients showed significant improvement in IKDC objective scores after surgery [3].

Aim of the study

To study the clinical outcome of Laprade technique for posteriolateral corner injury of the knee.

Materials and Methods

This is a prospective and of 20 patients operated between January 2015 and January 2017. Inclusion criteria- Males and females age ranging from 18 to 40 years, Posteriolateral corner injury, No previous surgery performed on the affected knee, No previous cruciate ligament damage sustained in either the affected or the contralateral knee. Exclusion criteria-Patients with medial collateral ligament injury, Patients with posterior cruciate ligament injury, Patients with anterior cruciate ligament injury, Evidence of osteoarthritis on plain radiographs, patients with generalized ligamentous laxity.

Patients diagnosed with PLC injury were operated in our hospital with La Prade PLC reconstruction technique. The study was approved by the ethical committee and the patients gave their informed consent to participate.

Preoperative Evaluation- Patient's detailed history is taken including age, sex, medical history, and clinically evaluated by Dial test, Varus stress test. Patient is further evaluated radiologically by antero posterior view and lateral view of involved side knee joint X-rays. Preoperative investigations included hemoglobin, blood grouping, others relevant tests depending on co-morbidity and to rule out infection, total leucocyte count, Differential count, Erythrocyte sedimentation rate (ESR), C reactive protein(CRP) were done. Patient is evaluated by using Lysholm scale and IKDC scoring scale.

The study proforma consists of patient identification data in the form and physical examination findings were noted. Lysholm and IKDC objective proformas are administered to the patients completed preoperatively, at one site and on the basis of a retrospective chart review at the other site, and at the time of the follow-up examination at both sites. Objective changes in knee stability were evaluated by comparing the preoperative and postoperative findings of the clinical examinations and assessments performed with the IKDC form on the basis of the findings of the individual physical examination pertinent to postero-lateral knee instability.

Lysholm score evaluation-Final score is calculated by adding all the scores. Scores are categorized. A score of 100 means no symptoms or disability.

- Excellent : (95–100)
- Good : (84–94)
- Fair : (65–83)
- Poor : (<64)

IKDC Knee Score Evaluation

Scores for each item are summed to give a total score.

The total score is calculated as:
$$\frac{\text{Sum of items}}{\text{Maximum possible score}} \times 100$$

Postoperative evaluation-1) Lysholm score, 2) IKDC scores and 3) Postoperative complications.

Post op protocol

1. Rehabilitation Protocol- Goals of rehabilitation are pain and swelling control, maintaining range of motion, protection of ligament graft, building hamstring and quadriceps muscles and regaining near normal strength and return to pre-injury level of activity. Patients were non-weight-bearing for the first 6 weeks postoperatively.

2. Weeks postoperative- Compression bandage is applied for 2 days, Patient will be immobilized with Hinged knee brace Locked in extension, Passive range of motion is initiated on the first day postoperatively, and patients gradually progress to full range of motion as tolerated. Weight bearing permitted as pain permits, Range-of-motion exercises are performed without the immobilizer four times a day. The goal was to achieve at least 90° of knee flexion by the end of the second week.

3. Weeks postoperative-The range of motion is increased as tolerated, with the goal of achieving full extension and flexion by the end of the sixth week, if the straight leg raising test had done without an extension lag, they were allowed to do them without a knee immobilizer. In addition to above exercises basic lower-extremity and core strengthening exercises were performed without weight-bearing.

4. Weeks-3months-The patients began bearing weight at seven weeks and were weaned off crutches, They were allowed to use a stationary bicycle increasing knee motion with low-resistance exercises, Limited-resistance weight-training, starting with one-quarter of their body weight and progressing to one-half of their body weight as tolerated, but they were instructed not to exceed 70° of flexion while performing leg presses or mini-squat exercises. Other weight bearing exercises to restore joint proprioception and balance were initiated.

5. Months -6months-Achieve full range of motion and a normal gait pattern by the thirteenth to sixteenth week, Low-impact exercises like cycling, swimming, walking, or using elliptical machines, running is typically allowed around 6 months. Return to sports is not allowed before 6 months.

Results

For final end result evaluation, all patients were reviewed and analyzed at the end of 6 months postoperatively. Results include preoperative, intra-operative findings and postoperative subjective assessment scores and examination findings, IKDC scoring scale, and range of motion, measured to the nearest 5 degrees by using a Goniometer. Means and frequencies were calculated for the demographic data and the results of the subjective questionnaire analysis. The patients were in the age range of 18 to 44 years with the mean age Laprade reconstruction group is 26.09. Males were 18 in number and females were 2. In this study, 14 patients had right side injury and 6 patients had left side injury. The presenting complaints were, with only complaint of pain were 9(45%), patients with only complaint of giving away were 7(35%) and patients with complaint of pain associated with giving away were 4(20%) –Table 1.

Table 1: Chief complaints in the patients

Presenting complaints	La Prades
Pain	9 (45%)
Giving away	7 (35%)
Pain and giving away	4 (20%)
Total	20 (100%)

In this study, when the time of injury and surgery were calculated, 4 patients (20%) presented within 3 months of injury, 8 patients (40%) in 4-6 months, 5 patients (25%) in 7-

9 months of injury and 3 patients(15%)in 10-12 months-Table 2.

Table 2: Time from injury to surgical intervention

Duration	La prades
0-3 months	4 (20%)
4-6 months	8 (40%)
7-9 months	5 (25%)
>10 months	3 (15%)
Total	20 (100%)

In this study, the preoperative evaluation 20 patients (100%) were positive for Dial test, and in the postoperative evaluation all 20 patients (100%) were negative for Dial test. The preoperative evaluations for 20 patients (100%) were positive for Varus test, and in the postoperative evaluation 20 patients (100%) were negative for Varus test.

The preoperative range of motion was measured with goniometer. Normal range of motion (0-140°) was seen in 8 patients (40%), 6 patients (30%) had good range of motion (0-120°). 2 patients (10%) had range of motion (0-110°), 2 patients (10%) had range of motion (0-100°), 2 patients (10%) had (0-90°) range of motion

Post operatively 15 patients (75%) had full range of motion (0-140°).1 patient (5%) had (0-130°) range of motion, and 4 patients (20%) had range of motion (0-120°)-Table 3.

Table 3: Range of Motion (ROM) in La Prade reconstruction technique

ROM	Pre-operative	Post-operative
0-90	2(10%)	0
0-100	2(10%)	0
0-110	2(10%)	0
0-120	6 (30%)	4(20%)
0-130	0	1(5%)
0-140	8(40%)	15(75%)
Total	20 (100%)	20(100%)

When complication was analyzed, knee pain was the chief complication in all the cases.

Lysholm scores

Pre-op Scores: Mean preoperative lysholm score for Laprade reconstruction technique was 46.05 ± 12.529 with scores ranging from 20-70 with median value of 47.0

Post op Scores: Mean postoperative lysholm score for Laprade reconstruction rtechnique was 85.7 ± 8.802 with scores ranging from 60-96 with median value of 87.0. Lysholm Score is tabulated in Table 4.

Table 4: Lysholm Score

Score	La Prade
Excellent	4 (20%)
Good	9 (45%)
Fair	6 (30%)
Poor	1 (5%)
Total	20 (100%)

IKDC objective score

Pre-op Scores: Mean preoperative IKDC score for Laprade group is 36.9 ± 6.39 with scores ranging from 31-46 with median value of 38.5.

Post op Scores: Mean postoperative IKDC score for Laprade group is 84.9 ± 5.67 with scores ranging from 73-92 with median value of 85.5.



Fig 1-2: Postoperative follow-up of the patient showing Leg Raise test

Discussion

Posterolateral corner injuries or commonly termed as PLC injuries of the knee are injuries to a complex area formed by the interaction of multiple structures. Injuries to the PLC often occur in combination with other ligamentous injuries to the knee which most commonly include the anterior cruciate ligament (ACL) and Posterior cruciate ligament (PCL). Patients often complain of pain and instability at the joint with

concurrent nerve injuries, patients may experience numbness, tingling and weakness of the ankle dorsiflexors and great toe extensors or a foot drop. The most common mechanisms of injury to the postero-lateral corner are a hyperextension injury, direct trauma to the antero-medial knee and non-contact varus force to the knee [4, 5, 6].

The majority of posterolateral knee injuries occur in combination with another ligamentous injury such as cruciate

ligaments tear and this makes the diagnosis difficult. During the physical exam, it is imperative to assess a patient for nerve injury as upto 15 % of PLC injuries have associated nerve damage. Numbness, tingling and/ or dorsi-flexor or great toe extensor muscle weakness suggest nerve involvement or damage [7, 8].

Follow-up studies by Levy *et al.* and Stannard *et al.* both examined failure rates for posterolateral corner repairs and reconstructions. Failure rates repairs were approximately 37 – 41% while reconstructions had a failure rate of 9% [9, 10]. Other less common surgical complications include deep vein thrombosis (DVTs), infection, blood loss and nerve/artery damage. The best way to avoid these complications is to preemptively treat them. DVTs are typically treated prophylactically with either Aspirin or sequential compression devices. In high risk patients there may be a need for prophylactic administration of low molecular weight heparin (LMWH). In addition, having a patient get out of bed and ambulate soon after surgery is a time honored way to prevent DVTs. Excessive blood loss and nerve/artery damage are rare occurrences in surgery and can usually be avoided with proper technique and diligence; however, the patient should be warned of these potential complications, especially in patients with severe injuries and scarring.

In the LaPrade group, the preoperative range of motion was measured with goniometer. Normal range of motion (0-140°) was seen in 8 patients (40%), 6 patients (30%) had good range of motion (0-120°). 2 patients (10%) had range of motion (0-110°), 2 patients (10%) had range of motion (0-100°), 2 patients (10%) had (0-90°) range of motion. Post operatively 15 patients (75%) had full range of motion (0-140°). 1 patient (5%) had (0-130°) range of motion, and 4 patients (20%) had range of motion (0-120°).

The clinical outcome results vary among the related studies, presenting mean postoperative Lysholm scores ranging from 65.5 to 91.8 and mean postoperative International Knee Documentation Committee scores ranging from 62.6 to 86.0. Mean preoperative Lysholm score for LaPrade group is 46.05 \pm 12.529 mean postoperative score for group is 85.7 \pm 8.802. Yoon and colleagues compared a non-anatomic fibular sling PLC reconstruction technique with an anatomic based reconstruction and demonstrated improved Lysholm scores and improved varus and external rotation laxity in the anatomic reconstruction group [11].

Mean preoperative IKDC score for LaPrade reconstruction was 36.9 \pm 6.39 with mean postoperative score 84.9 \pm 5.67. A prospective evaluation by Geeslin *et al.* demonstrated significant improvements in all IKDC objective scores, side-to-side differences in varus stress radiographs, and improvement in mean Cincinnati and IKDC subjective outcomes scores [12].

In 2002 Buelow *et al.* performed a prospective nonrandomized trial comparing femoral fixation with a bioabsorbable Larson (Arthrex, Karlsfeld, Germany) with an LaPrade I (Smith and Nephew Inc, Andover, MA). There were 30 patients in each arm. Outcome measures used at 2 years' follow up were radiographs, International Knee Documentation Committee (IKDC) score, Cincinnati Knee Score, and KT-1000TM (MEDmetric Corp, San Diego, CA) measurements and found out that both methods were similar in outcomes.

It was comparable to our study. Outcomes were measured after 6 months follow up. Our study also showed similar outcomes.

Conclusion

The posterolateral knee reconstruction technique or La Prade technique presented here significantly improved objective stability in patients with a chronic posterolateral knee injury.

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