

A study of clinical outcome following arthroscopic posterior cruciate ligament reconstruction

Chandan C Shetty

Consultant Orthopaedic surgeon, Bhaktivedant Hospital and Research Centre, Bhaktivedant Swami Marg, Mira Road, Mira Bhayandar, Thane, Maharashtra, INDIA.

Email: chandan775@gmail.com

Abstract

Background: Knee joint is a primary weight bearing joint, commonly injured in accidents, sports activity. Posterior Cruciate Ligament (PCL) injuries are not so common, can occur in isolation or in combination with other knee joint injuries and prone to be easily missed without a high index of suspicion. Studies reported Posterior cruciate ligament (PCL) injuries in 1% to 40% of all acute knee injuries, of mostly associated with multi-ligamentous knee injuries. The purpose of the present study was to evaluate the surgical outcome of arthroscopic PCL reconstruction. **Material and Methods:** This retrospective and descriptive study was conducted in patients undergoing arthroscopic PCL reconstruction. **Results:** 18 patients were included in this study. Common age group was 21 to 35 years (67 %) and PCL injuries were common in men (94 %). Combined injuries were 67 % while isolated injuries were 33 %. High number of isolated injuries is mainly due to high suspicion, experienced radiologists in knee injury. As per Knee Dislocation Schenck classification type I, II, III, IV fractures were 33%, 39%, 17%, 11% respectively. There were significant improvements from preoperative to 1-year follow-up in KOOS (KOOS (Knee injury and Osteoarthritis Outcome Score) scores, Tegner activity score, IKDC subjective and objective outcome scores. **Conclusion:** Patients with both isolated and combined PCL reconstructions had improved in terms of stability and subjective knee function after surgical management.

Key Words: PCL reconstruction; knee; arthroscopy

Address for Correspondence:

Dr. Chandan C Shetty, Consultant Orthopaedic Surgeon, Bhaktivedant Hospital and Research Centre, Bhaktivedant Swami Marg, Mira Road, Mira Bhayandar, Thane, Maharashtra, INDIA.

Email: chandan775@gmail.com

Received Date: 29/04/2019 Revised Date: 01/05/2019 Accepted Date: 23/06/2019

DOI: <https://doi.org/10.26611/10201112>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
07 July 2019

INTRODUCTION

Knee joint is a primary weight bearing joint, commonly injured in accidents, sports activity. Posterior Cruciate Ligament (PCL) injuries are not so common, can occur in isolation or in combination with other knee joint injuries

and prone to be easily missed without a high index of suspicion. Studies reported Posterior cruciate ligament (PCL) injuries in 1% to 40% of all acute knee injuries, of mostly associated with multi-ligamentous knee injuries. The complex anatomy of the PCL consists of two bundles based on the ligament function in flexion and extension^{2,3,4}. The anterolateral bundle which accounts for at least 2/3 of the entire PCL, it is the primary restraint for maintaining the posterior stability of tibia at 0°–120° of flexion. Posteromedial bundle maintains the posterior stability of tibia at hyperextension and flexion over 120°. Improvements in understanding of biomechanics of PCL and its insufficiency, advanced diagnostic tests like MRI and high suspicion have improved diagnosis of these injuries. Management of injuries to the PCL has been evolving from conservative management to selective surgical management⁵. The proximal avulsion tears can

How to site this article: Chandan C Shetty. A study of clinical outcome following arthroscopic posterior cruciate ligament reconstruction. *MedPulse International Journal of Orthopedics*. July 2019; 11(1): 07-10. <https://www.medpulse.in/Orthopedics/>

be treated with arthroscopic primary repair^{6,7}, whereas mid substance tears are generally treated with PCL reconstruction⁸, distal bony avulsion can be treated with internal fixation⁹. Initially open primary repair was the preferred treatment of PCL injuries⁹. Deep location, complex joint anatomy forced to develop minimal invasive approaches like micro endoscopy-assisted and arthroscopic techniques⁹. The goal of arthroscopic primary repair is the preservation of the native PCL using a minimally invasive method and subsequent protection of this repair using suture augmentation. The purpose of the present study was to evaluate the surgical outcome of arthroscopic PCL reconstruction.

MATERIAL AND METHODS

This retrospective and descriptive study was conducted in Department of Arthroscopy and sports medicine, Baby memorial hospital Calicut, Kerela. Patients underwent arthroscopic reconstruction of posterior cruciate ligament during January 2016 to Dec 2018 (3-year period). As a retrospective study, permission to review records was obtained from concerned authority. Department has kept separate follow up record for arthroscopic PCL reconstruction patients, which proved useful. Data combined from indoor papers and follow up records. Detailed history, physical examination findings, investigations like MRI knee, operative details, postoperative outcome were documented. The pre-operative evaluation had a mandatory MRI knee. All

patients were operated by senior faculties. Complete 1-year follow-up was considered, follow up taken by senior surgeon with a standardized objective clinical examination and subjective scoring such as validated KOOS score¹⁰, International Knee Documentation Committee [IKDC] score. Knee joint functionality and activity level was assessed by Tegner activity score¹¹. All data was collected in Microsoft excel sheet and analysed accordingly.

RESULTS

PCL injuries are not so common, during study period we had total 19 patients, arthroscopically operated for repair of PCL. One patient has not completed follow-up till one year, so 18 patients were included in this study. Due to factors as uncommon nature of injury, patient number is less. Common age group was 21 to 35 years (67 %) and PCL injuries were common in men (94 %). Outdoor activity and travelling is more common in males, more exposure to trauma may be the cause for male predominance. High-velocity trauma in road traffic accident was the most common mode of injury noted in our study. Combined injuries were 67 % while isolated injuries were 33 %. High number of isolated injuries is mainly due to high suspicion, experienced radiologists in knee injury. As per Knee Dislocation Schenck classification type I, II, III, IV fractures were 33%, 39%, 17%, 11% respectively.

Table 1: General characteristics

	Frequency	Percentage
Age Group		
15-25 years	3	17%
21-35 years	12	67%
36-50 years	2	11%
Above 50 years	1	6%
Gender		
Male	17	94%
Female	1	6%
Injury type		
Isolated	6	33 %
Combined	12	67%
Schenck classification		
KD I: ACL or PCL	6	33%
KD II: ACL + PCL	7	39%
KD III: ACL + PCL + PMC or PLC	3	17%
KD IV: ACL + PCL + PMC + PLC	2	11%

KD, knee dislocation; ACL, anterior cruciate ligament; PCL, posterior cruciate ligament; PMC, posteromedial corner; PLC, posterolateral corner

Table 2: Evaluation

	Pre-operative	Pre-operative	Statistical significance
KOOS (Knee injury and Osteoarthritis Outcome Score)			
Symptoms	55.8 ± 6.8	73.1 ± 9.2	Significant
Pain	60.3 ± 5.9	78 ± 11.3	significant
ADL (activities of daily living)	65.4 ± 7.6	79.3 ± 9.5	significant
Sports	45.5 ± 9.3	62.1 ± 7.8	significant
QoL (quality of life)	47.1 ± 7.7	63.2 ± 8.1	significant
Tegner activity score	2.7 ± 1.4	4.3 ± 1.7	significant
IKDC (International Knee Documentation Committee)			
IKDC subjective	57.1 ± 7.2	71.1 ± 8.9	significant
IKDC objective			
A	5.3 ± 1.4	8.2 ± 1.8	significant
B	4.6 ± 1.7	8.4 ± 1.6	significant

The standard PCL reconstruction procedure was arthroscopic double-bundle reconstruction with fixation at the tibial side with bioabsorbable screw and femoral fixation with endobutton, while ACL reconstruction done by with graft in the native ACL footprint. Standard post-operative care was provided. Hinged brace provided for 8 weeks. For first 6 weeks, non-weightbearing was advised and the brace was fixated in 0 to 20 degree of flexion. Next 2 weeks, weightbearing activities initiated and gradually increased. We noted minor superficial infection in two patients, managed conservatively. Regular follow up was taken at 3,6,9 and 12 months. There were significant improvements from preoperative to 1-year follow-up in KOOS (KOOS (Knee injury and Osteoarthritis Outcome Score) scores, Tegner activity score, IKDC subjective and objective outcome scores.

DISCUSSION

In India, most of daily living habits such as squatting, sitting cross leg requires extreme flexion at knee joint. Trauma to knee joint increased in recent 10-20 years. Use of 2-wheeler motorcycles, other road traffic accidents, sports activities are main causes of trauma to knee joint. Knee joint injuries are challenging to the orthopedic surgeons because of their variety, complexity, different concepts of management and injuries associated with it. Post-trauma knee fractures are known to cause varying degrees of limitation in knee movements. Conservative treatment results in knee stiffness, due to joint line incongruity and early osteoarthritis. Surgical anatomic reduction and fixation has reduced incidence of osteoarthritis. Ligament injuries are common in knee joint and difficult to diagnose because of multilimbed injuries, complex anatomy, prone to be missed easily, anatomically difficult location, etc. The posterior cruciate ligament (PCL) is an important structure, plays important role in maintaining knee joint stability during flexion and rotation. Since the PCL is strong structure, injuries are not so common, if present many times associated with other ligament injuries. Ideally PCL injuries should be

anatomically reduced and fixed for complete restoration of PCL function¹². Conservative treatments in such cases had unsatisfactory results mainly due to functional disability and fracture nonunion¹³. Many surgeons believe the displaced or unstable tibial avulsion fracture of PCL should be reduced and fixed anatomically through surgeries with various techniques¹³. Surgical treatments for PCL injuries include arthroscopic repair as well as open reduction and internal fixation. Each procedure had their own advantages and disadvantages, basically type of surgery depends on factors such as presence of other injuries (ligaments, tibial), movements required at knee joint, availability of endoscopy facilities, skill of surgeon, financial and other factors. Open reduction and fixation are traditional approach, technically easier than arthroscopic surgery, does not have requirement for specialized equipment, has a relatively short learning curve¹⁴; whereas it has a potential risk of significant soft tissue damage and neurovascular damage, as the tibial attachment of PCL is located in an area difficult to access¹⁵. Recently, due to its deep location and the complexity of the adjacent anatomy, minimally invasive arthroscopic techniques are gaining interest¹⁶. The additional advantages of the arthroscopic approach are direct visualization of fragment reduction and concomitant intra-articular injuries in the form of meniscal tears; further, osteochondral loose fragments or ligament injuries may be addressed at the time of the operation¹⁷. Despite comparable biomechanical properties of open and arthroscopic techniques, there is a paucity of comparative clinical studies (open vs. arthroscopic) in the literature.

CONCLUSION

Patients with both isolated and combined PCL reconstructions had improved in terms of stability and subjective knee function after surgical management. There are still controversies surrounding PCL reconstruction techniques, and the current literature is lacking in that.

REFERENCES

1. Fanelli GC, Beck JD, Edson CJ. Current concepts review: The posterior cruciate ligament. *J Knee Surge* 2010;23:61-72.
2. Girgis FG, Marshall JL, Monajem A. The cruciate ligaments of the knee joint. Anatomical, functional and experimental analysis. *Clin Orthop Relat Res* 1975;Jan-Feb (106):216-31.
3. Race A, Amis AA. The mechanical properties of the two bundles of the human posterior cruciate ligament. *J Biomech* 1994;27:13-24.
4. Harner CD, Janaushek MA, Kanamori A, Yagi M, Vogrin TM, Woo SL, *et al.* Biomechanical analysis of a double-bundle posterior cruciate ligament reconstruction. *Am J Sports Med* 2000;28:144-51.
5. Pournaras J, Symeonides PP. The results of surgical repair of acute tears of the posterior cruciate ligament. *Clin Orthop Relat Res* 1991;267:103-107.
6. DiFelice GS, van der List JP. Arthroscopic primary repair of posterior cruciate ligament injuries. *Oper Tech Sports Med* 2015;23:307-314.
7. Rosso F, Bisicchia S, Amendola A. Arthroscopic repair of “peel-off” lesion of the posterior cruciate ligament at the femoral condyle. *Arthrosc Tech* 2014;3:e149-e154.
8. DiFelice GS, Lissy M, Haynes P. Surgical technique: When to arthroscopically repair the torn posterior cruciate ligament. *Clin Orthop Relat Res* 2012;470:861-868.
9. Chen SY, Cheng CY, Chang SS, *et al.* Arthroscopic suture fixation for avulsion fractures in the tibial attachment of the posterior cruciate ligament. *Arthroscopy* 2012;28:1454-1463.
10. Roos EM, Lohmander LS. The Knee injury and Osteoarthritis Outcome Score (KOOS): from joint injury to osteoarthritis. *Health Qual Life Outcomes*. 2003;1:64.
11. Tegner Y, Lysholm J. Rating systems in the evaluation of knee ligament injuries. *Clin Orthop Relat Res*. 1985;198:43-49.
12. Sabat D, Jain A, Kumar V. Displaced posterior cruciate ligament avulsion fractures: a retrospective comparative study between open posterior approach and arthroscopic singletunnel suture fixation. *Arthroscopy*. 2016;32:44-53.
13. Strobel MJ, Weiler A, Schulz MS, Russe K, Eichhorn HJ. Arthroscopic evaluation of articular cartilage lesions in posterior-cruciate-ligament-deficient knees. *Arthroscopy*. 2003;19:262-8.
14. Chiarapattanakom P, Pakpianpairoj C, Liupolvanish P, Malungpaishrope K. Isolated PCI avulsion from the tibial attachment: residual laxity and function of the knee after screw fixation. *J Med Assoc Thai*. 2009;92 Suppl 6:S181-8.
15. Yang CK, Wu CD, Chih CJ, Wei KY, Su CC, Tsuang YH. Surgical treatment of avulsion fracture of the posterior cruciate ligament and postoperative management. *J Trauma*. 2003;54:516-9.
16. Huang W, Gong X, Rahul M, Priyanka S, Wang C, Liang X, Ding G, Hu N. Anterior arthroscopic-assisted fixation of posterior cruciate ligament avulsion fractures. *Eur J Med Res*. 2015;20:88.
17. Gwinner C, Hoburg A, Wilde S, Schatka I, Krapohl BD, Jung TM. All-arthroscopic treatment of tibial avulsion fractures of the posterior cruciate ligament. *GMS Interdiscip Plast Reconstr Surg DGPW*. 2016;5:Doc02.

Source of Support: None Declared
Conflict of Interest: None Declared