ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: www.ijmacr.com

Volume – 5, Issue – 6, November – December - 2022, Page No. : 15 - 21

Arthroscopic posterior capsular decompression among patients with recalcitrant fexion contracture

[1]Girish Chandra Sahoo, Assistant Professor, Department of Orthopaedics, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India

Corresponding Author: Girish Chandra Sahoo, Assistant Professor, Department of Orthopaedics, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India

How to citation this article: Girish Chandra Sahoo, "Arthroscopic posterior capsular decompression among patients with recalcitrant fexion contracture", IJMACR- November – December - 2022, Vol – 5, Issue - 6, P. No. 15 – 21.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: Determine patient-reported outcomes (PROs) following surgery and assess the therapeutic effectiveness of arthroscopic posterior capsular release for increasing range of motion (ROM) in cases of intractable flexion contracture.

Method: A retrospective case analysis was done to find patients who received arthroscopic posterior capsular release due to chronic knee extension deficiency despite intensive non-operative physical treatment. At the last follow-up, the International Knee Documentation Committee (IKDC), Tegner, and visual analogue scale (VAS) PROs and knee ROM were gathered. A total of 20 patients with a median age of 36 years were included. 34%) of them were men, and 466% were women. Knee flexion contracture following anterior cruciate ligament surgery was the most frequent aetiology (58%). All patients had at least three months of nonoperative treatment fail. 99% of patients underwent physical therapy, 63% knee extension bracing or casting, and 37% corticosteroid injections prior to surgical surgery. In comparison to 1 (IQR: 0-4) postoperatively, the median preoperative extension was 14 (IQR: 9-24) (P .001). The median extension at the last follow-up was 0. (IQR: 0-3.4). At final contact, postoperative VAS pain levels at rest (1 vs 0; P 14.002) and with usage (5 vs 1.8; P 14.016) recovered, and the majority of patients (93%) said they kept their extension range of motion intact. With use, ultimate contact was enhanced (5 vs 1.8; P 14.017), and the majority of patients (94%) said they kept their extension range of motion. In comparison to patients with other causes of extension deficit, patients with ACL-related extension deficit had improved IKDC (81 vs 51.3; P 14.008), Tegner (5.8 vs 3.6; P 14.007), and VAS pain ratings (rest: 0.2 vs 1.8; P 14.008; use: 1.3 vs 5; P 14.004) scores.

Conclusion: An efficient way to lessen pain and restore terminal extension in cases of recalcitrant flexion contracture is through arthroscopic posterior capsular release. At final follow-up, 94% of patients had their

postoperative extension improvement still present, with a 14% intraoperative and postoperative rate.

Keywords: ROM, PROs, VAS

Introduction

Even for the most seasoned surgeons, flexion contracture or terminal extension deficiency is a problematic clinical issue. Acute inflammatory response, recurring microtrauma, or—most frequently—as a consequence of knee surgery—are some of the etiologies of this syndrome. Unfortunately, despite effective nonoperative treatments such physiotherapy for range of motion, quadriceps training, and extension orthosis bracing, 0.5-11% of patients do not experience a sufficient recovery of range of motion (1-6). Surgical technique, preoperative range of motion, concurrent or repeated surgeries, pain treatment, and BMI are all potentially modifiable (7). However, even with a prevention-first strategy, those who later develop a chronic extension deficit remain challenging to treat. Due to surgical trauma or injury, the posterior capsular tissues constrict, resulting in decreased range of motion and loss of terminal knee extension (8,9). By placing more strain on the quadriceps and patellofemoral articular cartilage, this is especially detrimental to knee function and leads to poor patient outcomes, deteriorated knee function, and increased morbidity and disability (10). The research shows that different surgical approaches are taken to treat posterior capsule contracture. An open posterior capsulotomy can be carried out successfully, as shown by earlier research (12,13). Additionally, Mariani (14) demonstrated the efficacy of a combined open and arthroscopic method for treating severe flexion contractures, but both procedures carry a sizable risk of complication when used in close proximity to neurovascular systems. An arthroscopic method has been reported, and although more posterolateral release is desirable, posteromedial release is often sufficient to achieve ROM (15,16). The objectives of this study were to: 1) assess the clinical effectiveness of arthroscopic posterior capsular release for increasing range of motion in cases of intractable flexion contracture; and 2) ascertain postoperative patient-reported outcomes (PROs). We predicted that better knee motion with acceptable PRO ratings would follow arthroscopic posterior capsular release.

Methods

Patients gave informed consent at Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, which served as the study's primary location. Following IRB approval, individuals undergoing posterior capsular release procedures were searched for in a database of institutional operating notes. The initial patient sample for screening was referred to as "capsular release" and "capsule release". The inclusion of operational notes and patient charts was verified. Patients qualified for inclusion if they met the following criteria: 1) they underwent arthroscopic posterior capsular release for a symptomatic, relative extension deficit of at least 10; 2) they did not respond well to conservative management, which included 2 months of physical therapy, bracing, or injection; and 3) they had clinical follow-up with recorded range of motion.

Age, sex, body mass index (BMI), smoking status, and other patient information were obtained by reviewing the patient's medical records. At the final follow-up, patient-reported outcomes were gathered from patients with native knees, including VAS pain, IKDC, and Tegner scores. 20 The elements that contribute to reaching the threshold patient-acceptable symptom condition for knee function, or IKDC PASS, were further examined (12).

Patients were asked if their knee extension range of motion had improved, remained the same, or gotten worse since their previous appointment. When necessary, patients were called by phone for a final check-in. **Statistical Analysis:** When necessary, categorical variables were analysed using the c2 (Chi-square) test or the isher's exact test. All tests were two-sided, and significant results were defined as P values below.04**.**

Results

30 patients undergoing posterior capsular release were found in the initial search. Concomitant unicompartmental knee arthroplasty was performed on one patient. As 99% of patients underwent physical therapy, 63% underwent knee bracing or casting, and 35% underwent corticosteroid injection before necessitating surgical intervention, all patients failed nonsurgical care. The anterior cruciate ligament (ACL) restoration following ACL damage accounted for 58% of cases of extension deficiency. 40% of patients had previous anesthetic-assisted manipulation, and 49% had arthroscopic debridement. The average amount of time from the most recent surgery or injury to capsular release was 6.0 months (IQR: 3.2-11.8). 3 patients hadn't had any prior knee operations. The median extension before surgery was 14 (IQR: 9-24), but it quickly decreased to 1 (IQR: 0-4) afterward (P .001). The median extension at the last follow-up was 0. (IQR: 0-3.4). Preoperative median flexion was 107.4 (IQR: 89-126.2), but postoperative median flexion was 134 (IQR: 109-139) (P .001).

Table 1: Contains the aetiology, past surgical operations, and ROM results.

Pathology	Last Operation	Time from Surgery to PCR (months)	Extension		Flexion		Final follow-up
			Pre-op	Post-op	Pre-Op	Post-op	
ACL injury	Arthroscopic debridement, MUA	17.5	15	0	135	135	46.4
	ACLR	8.5	10	0	120	135	13.8
	Arthroscopic	15.4	10	0	120	145	9.0
	Debridement Hardware removal	51.7	15	0	100	100	53.4
	ACLR	7.4	15	-4	135	150	15.5
	Arthroscopicde bridement, MUA	2.4	20	0	75	125	79.7
	ACLR	1.4	10	0	100	135	74.5
	ACLR	6.8	35	15	90	70	7.8
	ACLR	8.9	10	0	105	160	69.3
ACL injury, lateral and medial	ACLR, lateral and medial meniscus	5.6	20	2	120	135	15.1

meniscus tear							
ACL injury and lateralmeniscus tear	ACLR, lateral and medialmeniscectoy	12.0	10	0	130	140	4.3
ACL injury	None (ACL injury treated non op)	N/A	35	0	85	130	42.3
Osteochondral lesion of lateral femoral condyle	Arthroscopic debridement	12.4	25	10	93	95	54.5
54.5MPFL instability	TTO	2.7	7	2	110	140	41
PVNS	Arthroscopic debridement	4.3	30	2	90	110	50.9
	None (PVNS)	N/A	25	5	90	129	71.8
Tibial fracture	Arthroscopic debridement	2.7	15	0	120	140	38.6
ACL injury	Arthroscopic debridement	11.3	10	5	125	135	123.1
Osteochondritis dissecans	Arthroscopic debridement, MUA	10.0	20	3	100	111	147.2
Post-arthroscopic infection	I & D	1.4	25	-5	55	96	6.8
Tibial/Fibular fracture	ORIF tibial plateau fracture	11.6	15	6	135	140	3.0
ACL injury, medial and lateral meniscus tear	MUA	9.9	17.4	1.8	108.1	127.3	44.2

At the time of posterior capsule release, 17 patients underwent arthroscopic debridement, four patients had cyclops lesions removed, two underwent synovectomy, three underwent chondroplasty, two underwent ACL graft resection, and two underwent hardware removal. The majority of patients (93%) said they kept their extension range of motion at a median. For recalcitrant loss of extension, 13% patients needed extra intervention. At the time of the last follow-up, 2 patients had MUA, 1 had revision arthroscopic debridement with

medial and lateral retinacular releases, and 1 had revision posterior capsular release and had undergone total knee arthroplasty. The patient who underwent a through-knee amputation had prolonged pain, limited range of motion, and functional limitations. 85% of the patients with native knees had PROs, with an average score of 3.6. (range: 0.2-12.2). For PROs, 2 patients could not be reached. Patients who experienced extension deficit due to ACL-related pathology reported substantially higher IKDC (80 vs 51.2; P 0.007) and Tegner (5.7 vs. 0.3) scores at final contact. 0.1 vs 1.7; P 0.007; use: 1.2 vs 4; P 0.004) scores with lower VAS pain ratings (rest: 1.2 vs 4; P 0.004) when compared to patients with various etiologies of extension deficiency. Additionally, more patients with ACL-related pathology (7/10) than with other etiologies of extension deficit (1/8) (72.6% vs 1%; P 0.002) met the PASS criterion for IKDC score.

Discussion

The main outcome of this study is that in situations of persistent extension deficiency of the knee, arthroscopic posterior capsular release is an effective method to restore knee function, lessen pain, and enhance range of motion. At the last follow-up, 93% of patients—all but one—reported retaining the improvement in knee extension. The most frequent cause of posterior capsular contracture in this study was ACL reconstruction after injury (58%), and patients with this condition had better subjective outcomes in terms of pain and function than those with other causes of capsular contracture at final follow-up. For the patient to be satisfied and for the knee to function normally, terminal knee extension must be regained. According to Sachs et al., loss of 10 percent of extension is poorly tolerated, loss of 5 percent of terminal extension can cause gait irregularity and lead to patellofemoral soreness with light walking (18). With a mean duration to capsular release of 8.0 months in the current investigation, nonoperative treatment was exhausted in all patients. Additionally, a few patients in this sample had unsuccessfully undergone previous intra-articular surgical intervention, such as debridement. According to La Prade et al., effectiveness with release is a therapy for persistent cases. They analyzed a similar group of patients who had failed various conventional treatment modalities. The choice between open capsulotomy and arthroscopic release, or a mix of the two, while performing surgical intervention for posterior capsular contracture, is another factor to take into account. In a study of 12 patients with chronic flexion contracture following ACL reconstruction, Tardy et al. found that both arthroscopic and open posterior release improved terminal extension (20) Similar to this, improvements in terminal extension utilising just arthroscopic intervention were described by Wierer et al. and LaPrade et al (19,21) The current study contributes to this body of work by successfully utilising an all-arthroscopic method. Even though they are more technically difficult, arthroscopic treatments typically result in shorter recovery times, less postoperative discomfort, and a lower risk of complications than open procedures (22). All things considered, arthroscopic posterior capsular release combined with thorough physiotherapy is a successful treatment choice for patients of persistent extension deficit following ineffective nonoperative care.

Conclusion

Pain can be well managed and terminal extension can be restored with arthroscopic posterior capsular release for intractable flexion contracture. With a 13% reoperation rate, the majority of patients (93%) had their

postoperative extension improvement still present at the time of final follow-up.

References

1. DeHaven KE, Cosgarea AJ, Sebastianelli WJ. Arthrofibrosis of the knee following ligament surgery. Instructional course lectures. 2003 Jan 1;52:369-81.
2. Cosgarea AJ, DeHaven KE, Lovelock JE. The surgical treatment of arthrofibrosis of the knee. The American Journal of Sports Medicine. 1994 Mar;22(2):184-91.
3. Shelbourne KD, Nitz P. Accelerated rehabilitation after anterior cruciate ligament reconstruction. The American journal of sports medicine. 1990 May;18(3):292-9.
4. Mayr HO, Weig TG, Plitz W. Arthrofibrosis following ACL reconstruction—reasons and outcome. Archives of orthopaedic and trauma surgery. 2004 Oct;124(8):518-22.
5. Harner CD, Irrgang JJ, Paul J, Dearwater S, Fu FH. Loss of motion after anterior cruciate ligament reconstruction. The American journal of sports medicine. 1992 Sep;20(5):499-506.
6. Werner BC, Cancienne JM, Miller MD, Gwathmey FW. Incidence of manipulation under anesthesia or lysis of adhesions after arthroscopic knee surgery. The American Journal of Sports Medicine. 2015 Jul;43(7):1656-61.
7. 7. Lee DR, Therrien E, Song BM, et al. Arthrofibrosis nightmares: Prevention and management strategies. Sports Med Arthrosc 2022;30:29-41.
8. Abdel MP, Morrey ME, Barlow JD, Kreofsky CR, An KN, Steinmann SP, Morrey BF, Sanchez-Sotelo J. Myofibroblast cells are preferentially expressed early in a rabbit model of joint contracture. Journal of Orthopaedic Research. 2012 May;30(5):713-9.
9. Unterhauser FN, Bosch U, Zeichen J, Weiler A. α-Smooth muscle actin containing contractile fibroblastic cells in human knee arthrofibrosis tissue. Archives of orthopaedic and trauma surgery. 2004 Nov;124(9):585-91.
10. Kim HY, Kim KJ, Yang DS, Jeung SW, Choi HG, Choy WS. Screw-home movement of the tibiofemoral joint during normal gait: three-dimensional analysis. Clinics in orthopedic surgery. 2015 Sep 1;7(3):303-9.
11. Ekhtiari S, Horner NS, de Sa D, Simunovic N, Hirschmann MT, Ogilvie R, Berardelli RL, Whelan DB, Ayeni OR. Arthrofibrosis after ACL reconstruction is best treated in a step-wise approach with early recognition and intervention: a systematic review. Knee Surgery, Sports Traumatology, Arthroscopy. 2017 Dec;25(12):3929-37.
12. Lobenhoffer HP, Bosch U, Gerich TG. Role of posterior capsulotomy for the treatment of extension deficits of the knee. Knee Surgery, Sports Traumatology, Arthroscopy. 1996 Dec;4(4):237-41.
13. Millett PJ, Williams RJ, Wickiewicz TL. Open debridement and soft tissue release as a salvage procedure for the severely arthrofibrotic knee. The American Journal of Sports Medicine. 1999 Sep;27(5):552-61.
14. Mariani PP. Arthroscopic release of the posterior compartments in the treatment of extension deficit of knee. Knee Surgery, Sports Traumatology, Arthroscopy. 2010 Jun;18(6):736-41.
15. Gomes JL, Leie MA, de Freitas Soares A, Ferrari MB, Sánchez G. Posterior capsulotomy of the knee:

Treatment of minimal knee extension deficit. Arthroscopy techniques. 2017 Oct 1;6(5):e1535-9.

16. Dean CS, Chahla J, Mikula JD, Mitchell JJ, LaPrade RF. Arthroscopic posteromedial capsular release. Arthroscopy Techniques. 2016 Jun 1;5(3):e495-500.
17. Muller B, Yabroudi MA, Lynch A, Lai CL, van Dijk CN, Fu FH, Irrgang JJ. Defining thresholds for the patient acceptable symptom state for the IKDC subjective knee form and KOOS for patients who underwent ACL reconstruction. The American Journal of Sports Medicine. 2016 Nov;44(11):2820-6.
18. Suresh KV, Ikwuezunma I, Margalit A, Lee RJ. Arthroscopic posterior capsulotomy for knee flexion contracture using a spinal needle. Arthroscopy Techniques. 2021 Aug 1;10(8):e1903-7.
19. LaPrade RF, Pedtke AC, Roethle ST. Arthroscopic posteromedial capsular release for knee flexion contractures. Knee Surgery, Sports Traumatology, Arthroscopy. 2008 May;16(5):469-75.
20. Sachs RA, Daniel DM, Stone ML, Garfein RF. Patellofemoral problems after anterior cruciate ligament reconstruction. The American journal of sports medicine. 1989 Nov;17(6):760-5.
21. Wierer G, Runer A, Gföller P, Fink C, Hoser C. Extension deficit after anterior cruciate ligament reconstruction: Is arthroscopic posterior release a safe and effective procedure?. The Knee. 2017 Jan 1;24(1):49-54.
22. Carr AJ, Price AJ, Glyn-Jones S, Rees JL. Advances in arthroscopy—indications and therapeutic applications. Nature Reviews Rheumatology. 2015 Feb;11(2):77-85.