

Original Article

Intra-articular drain versus no drain after arthroscopic anterior cruciate ligament reconstruction: A prospective comparative study

Rajiv Sharma¹, Amit Joshi¹, Bibek Basukala¹, Nagmani Singh¹, Rohit Bista¹, Sunil Panta¹, Ishor Pradhan¹

¹Department of Orthopedics, Baidya and Banskota (B&B) Hospital, Ashok Kumar Banskota Center for Arthroscopy, Sports Injury and Regenerative Medicine, Gwarko, Lalitpur, Nepal.

ABSTRACT

Objectives: The purpose of this study was to evaluate whether the use of an intra-articular drain the following arthroscopic anterior cruciate ligament reconstruction (ACLR) would have benefits in terms of post-operative range of motion, pain, and swelling as compared to the use of no drain.

Materials and Methods: This was a prospective comparative study conducted at the Department of Orthopedics, Baidya and Banskota (B&B) Hospital over a period of 11 months from August 15, 2021, to July 15, 2022. One hundred and fifteen patients who underwent ACLR with or without meniscal procedures were randomly assigned to two groups. Group A (55 patients) where the drain was used and Group B (60 patients) where the drain was not used. Patients were evaluated on day 3 and day 14 and post-operative outcome in terms of flexion loss, extension loss, Visual Analogue Scale (VAS) score, and suprapatellar girth was compared between these two groups.

Results: No significant difference in flexion loss, extension loss, suprapatellar girth, and VAS score was observed between these two groups both on day 3 and day 14.

Conclusion: We concluded that routine use of intra-articular drain is not necessary for arthroscopic ACLR.

Keywords: Anterior cruciate ligament (ACL) reconstruction, Drain, Range of motion (ROM), VAS score

INTRODUCTION

Anterior cruciate ligament reconstruction (ACLR) is one of the most common operations performed worldwide.^[1] Although the complication rate following ACLR is less, ranging from 1% to 15% in various literature, hemarthrosis is one of the common complications that can affect its outcome.^[2,3] Drains have been commonly used in orthopedics to evacuate hematoma with the presumption that it will decrease post-operative swelling, pain, and infection and facilitate early rehabilitation; however, the use of drains is guided by anecdotal evidence rather than based on proper clinical study.^[4] Furthermore, the use of intra-articular drain following ACLR is controversial. There are only a few studies in the literature comparing drain versus no drain following ACLR. Most of these studies do not support the routine use of intra-articular drain following ACLR.^[4-7] However, there are surgeons who routinely use drain following ACLR fearing local complications such as hematoma and infection. Hence, we planned a study to evaluate the usefulness of intra-articular drain following ACLR.

The purpose of this study was to evaluate whether the use of an intra-articular drain following ACLR compared with the use of no drain will have benefits in terms of pain, swelling, and range of motion (ROM).

MATERIALS AND METHODS

This was a prospective and randomized comparative study conducted at Ashok Kumar Banskota Center for Arthroscopy, Sports Injuries, and Regenerative Medicine, B&B Hospital over a period of 11 months (August 15, 2021–July 15, 2022). The Institutional Review Committee (IRC) approval was obtained from B&B IRC (Ref no- IRC_2021_08_23_04). All the patients presenting to the AKB center for arthroscopy, sports injuries, and regenerative medicine for arthroscopic ACLR meeting the criteria were included in the study. Patients with a previous history of any knee surgery, revision anterior cruciate ligament (ACL) surgery, bleeding disorders or in anticoagulation medicine, and ACL surgery with other procedures requiring prolonged immobilization were

*Corresponding author: Rajiv Sharma, Department of Orthopedics, Baidya and Banskota (B&B) Hospital, Ashok Kumar Banskota Center for Arthroscopy, Sports Injury and Regenerative Medicine, Gwarko, Lalitpur, Nepal. razivsharma555@gmail.com

Received: 27 May 2023 Accepted: 16 August 2023 Published: 02 September 2023 DOI: 10.25259/JASSM_9_2023

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, transform, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms. ©2023 Published by Scientific Scholar on behalf of Journal of Arthroscopic Surgery and Sports Medicine

excluded from the study. Informed written consent was taken. The sample size was calculated using G*power software with the power of the study to be 80%, probability error of 5%, and effect size of 50%.^[8] A total of 128 patients were enrolled in the study. The patients were randomized into two groups: The no-drain group and the drain group using computer-generated numbers. Keeping an allocation ratio of 1:1, each group was allocated 64 patients.

All surgeries were performed by surgeons trained in arthroscopic surgery. The technique used was standard trans-portal anatomic ACLR. In the drain group, a 14FG size disposable suction drain (ROMOVAC) was inserted through Anteromedial (AM) portal under direct visualization through the Anterolateral (AL) portal [Figure 1]. Drain fixation was done by two limbs of suture Prolene 2-0 that was used to close the AM portal. The drain was removed after 24 h. Both groups of patients underwent the same rehabilitation protocol.

Patients were examined on the 3rd and 14th post-operative days. VAS score, ROM, and suprapatellar girth were recorded. ROM was measured in terms of flexion loss and extension loss as compared to the contralateral limb. The suprapatellar girth was measured at the superior pole of the patella and the difference as compared to the contralateral limb was recorded. Other complications such as infection and hematoma will be documented and compared between these two groups.

All data were recorded in a Microsoft Excel chart. Data analysis was done using the Statistical Package for the Social Sciences (SPSS) version 24. Descriptive statistics in the form of mean and standard deviation were used for continuous variables and proportion for categorical variables to characterize the study sample. Paired *t*-test and Chi-square

tests were used for inferential analysis. Statistical significance was set at $P < 0.05$.

RESULTS

One hundred and twenty-eight cases were enrolled in this study. Thirteen patients were lost to follow-up at 2 weeks with four in the no-drain group and nine in the drain group; thus, these cases were excluded from the study. The remaining 115 patients were subjected to final analysis with 60 patients in the no-drain group and 55 patients in the drain group. The demographic variables were comparable in both groups [Table 1]. There was no significant difference in terms of additional meniscal procedures in both groups, as shown in [Table 1] making both groups comparable.

The mean VAS score [Table 2] in the drain group was slightly higher than the no-drain group on both the 3rd day (3.65 vs. 3.47) and 14th day (1.70 vs. 1.57). However, the difference was not statistically significant. ROM [Table 3] was assessed in terms of flexion loss and extension loss as compared to other limbs. There was no significant difference in flexion loss between the drain group and the no-drain group both on the 3rd day (47.27 vs. 46.33) and 14th day (17.27 vs. 17.58). Similarly, there was no significant difference in extension loss between the drain group and no-drain group both on the 3rd day (5.09 vs. 4.92) and 14th day (0.73 vs. 0.50). Suprapatellar girth [Table 4] also showed no significant difference between these two groups both on the 3rd day

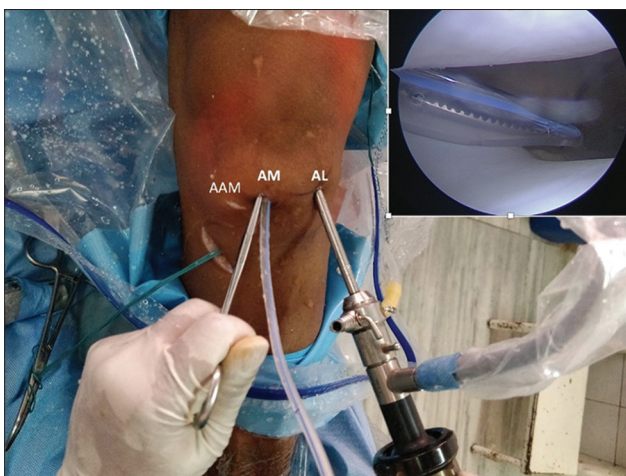


Figure 1: Placement of drain through AM portal under direct visualization by scope through AL portal. Inset: arthroscopic view of drain placed in suprapatellar pouch, AM: Anteromedial, AL: Anterolateral, AAM: Accessory anteromedial.

Table 1: Demographic variables.

	DRAIN (55)	NO DRAIN (60)	P-value
Age	27.76±8.63	29.85±7.88	0.479
M:F	50:5	49:11	0.15
MOI			
Sports	37	35	0.49
RTA	10	14	
Fall	8	11	
Injury surgery interval	13.67±22.76	22.86±29.13	0.08
Procedure			
ACLR	26	33	0.40
ACLR+meniscal procedure	29	27	

ACLR: Anterior cruciate ligament reconstruction, RTA: Road traffic accidents, M: Male, F: Female, MOI: Mode of injury. The number within the parenthesis denotes the frequency

Table 2: VAS score.

VAS Score	DRAIN	NO DRAIN	P-value
3 rd Day	3.65±1.31	3.47±1.22	0.91
14 th Day	1.70±0.92	1.57±0.82	0.45

VAS: Visual analogue scale

Table 3: ROM.

ROM	Day 3		P-value	Day 14		P-value
	Drain	No drain		Drain	No drain	
Flexion loss	47.27±9.99	46.33±9.78	0.74	17.27±9.66	17.58±6.85	0.12
Extension loss	5.09±5.22	4.92±5.32	0.57	0.73±1.77	0.50±1.51	0.14

ROM: Range of motion

Table 4: Suprapatellar girth.

Suprapatellar girth	DRAIN	NO DRAIN	P-value
3 rd Day	2.70±0.82	3.02±0.92	0.96
14 th Day	1.35±0.55	1.34±0.60	0.83

(2.70 vs. 3.02) and 14th day (1.35 vs. 1.34). There was one case of tense hemarthrosis in the no-drain group on day 3. There was one case of graft site infection in each group.

DISCUSSION

ACLR is a common and reproducible procedure with very few complications.^[1] Hemarthrosis is one of the common complications in ACLR surgery which can affect the post-operative outcome.^[1,3] Various methods have been employed to reduce post-operative hemarthrosis that includes the use of drain, compressive dressing, and tourniquet use; however, hemarthrosis is the most commonly reported complication.^[3] There are many theoretical advantages of using a drain. It decreases the rate of formation of hemarthrosis. Hemarthrosis is said to have a toxic effect on articular cartilage. It has also been associated with increased scar formation, decreased ROM, and synovitis.^[9] On the other side, the use of drains has been associated with increased wound contamination and bacterial proliferation in surgical wounds.^[9] There are few studies on the use of drain during ACLR. Most of these studies do not favor the use of drain following ACLR.^[7] However, there are surgeons who routinely use drains following ACLR fearing local complications such as pain, swelling, and infection. However, the use of drain is guided by anecdotal evidence rather than proper clinical study.^[4] We conducted this study to evaluate the usefulness of drain following ACLR in terms of VAS score, ROM, and suprapatellar girth.

In this study, we did not find a significant difference in VAS score between the two groups both on the 3rd day and 14th day. This finding was similar to the study done by McCormack *et al.*^[4] and Straw *et al.*^[5] who did not find significant differences in VAS scores between the two groups. Another study done by Dhawan *et al.*^[6] showed statistically significant decreased VAS score in the non-drain group in the early post-operative period (day 1, day 3, and day 5); however, on day 7, there was no significant difference in VAS score between the two groups. In our study, also we did find increased VAS

scores in the drain group both on the 3rd day and 14th day; however, the difference was not statistically significant. The increased pain in the drain group may be attributed to pain from the portal site or foreign body response.

There was no significant difference in ROM measured in terms of flexion loss and extension loss between the two groups both on the 3rd day and 14th day in our study. This finding was similar to the study done by McCormack *et al.*^[4] and Dhawan *et al.*^[6] who did not observe a significant difference in ROM between the drain and non-drain groups. A similar study done by Straw *et al.*^[5] showed significant improvement in ROM in the drain group up to 2 weeks but the difference was not significant at 4 weeks.

In our study, suprapatellar girth was higher in the no-drain group on day 3 as compared to the drain group; however, the difference was not statistically significant both on day 3 and day 14. This finding was similar to the study done by McCormack *et al.*^[4] and Dhawan *et al.*^[6] In a similar study done by Straw *et al.*^[5] there was a significant increase in suprapatellar girth at 2 weeks but no significant difference was observed at 4 weeks and 6 weeks.

One of the theoretical advantages of using a drain is to reduce the rate of infection. In our study, we did not have intra-articular infection but there was one graft site infection in each group which subsided after debridement and antibiotic use. There is no study in the literature which has compared the rate of infection in the drain versus the no-drain group following ACLR.

There was one case of tense hemarthrosis on day 3 in the no-drain group in our study which subsided after needle aspiration. In the study done by McCormack *et al.*^[4] two cases in each group required knee aspiration.

Limitations

This study has several limitations. Thirteen patients have to be excluded from the study as they did not come for follow-up on the 14th day. The drop-out rate was higher than expected which could have changed the results. The evaluator could not be blinded in this study, which may have led to evaluation bias. Painkiller requirement could have been another clinically important variable to study which was not recorded in this study. The aim of this research was to evaluate short-term outcomes; hence, patients were followed for up to 14 days only. A long-term follow-up would have elaborated on the complications in detail.

CONCLUSION

The mean VAS score in the drain group was slightly higher than the no-drain group both in the 3 days (3.65 vs. 3.47) and 14 days (1.7 vs. 1.57) follow-up. However, the difference was statistically not significant. Similarly, suprapatellar girth and ROM were also comparable in both groups during the follow-up period. One graft site infection was found in each group. Based on our data, routine use of intra-articular drain is unnecessary following ACLR.

Ethical approval

Approval was taken from the Institutional Review Committee of B&B Hospital.

Declaration of patient consent

The Institutional Review Board (IRB) permission obtained for the study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The author(s) confirms that there was no use of Artificial Intelligence (AI)-Assisted Technology for assisting in the

writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Kaeding CC, Léger-St-Jean B, Magnussen RA. Epidemiology and diagnosis of anterior cruciate ligament injuries. *Clin Sports Med* 2017;36:1-8.
2. Samitier G, Marcano AI, Alentorn-Geli E, Cugat R, Farmer KW, Moser MW. Failure of anterior cruciate ligament reconstruction. *Arch Bone Jt Surg* 2015;3:220-40.
3. Cinque ME, Chahla J, Moatshe G, DePhillipo NN, Kennedy NI, Godin JA, *et al.* Outcomes and complication rates after primary anterior cruciate ligament reconstruction are similar in younger and older patients. *Orthop J Sports Med* 2017;5:2325967117729659 .
4. McCormack RG, Greenhow RJ, Fogagnolo F, Shrier I. Intra-articular drain versus no drain after arthroscopic anterior cruciate ligament reconstruction: A randomized, prospective clinical trial. *Arthroscopy* 2006;22:889-93.
5. Straw R, Colclough K, Geutjens GG. Arthroscopically assisted ACL reconstruction. Is a drain necessary? *Knee* 2003;10:283-5.
6. Dhawan A, Doukas WC, Papazis JA, Scoville CR. Effect of drain use in the early postoperative period after arthroscopically assisted anterior cruciate ligament reconstruction with bone-patellar tendon-bone graft. *Am J Sports Med* 2003;31:419-24.
7. Clifton R, Haleem S, McKee A, Parker MJ. Closed suction surgical wound drainage after anterior cruciate ligament reconstruction: A systematic review of randomised controlled trials. *Knee* 2007;14:348-51.
8. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods* 2007;39:175-91.
9. Simpson LA, Barrett JP Jr. Factors associated with poor results following arthroscopic subcutaneous lateral retinacular release. *Clin Orthop Relat Res* 1984;186:165-71.

How to cite this article: Sharma R, Joshi A, Basukala B, Singh N, Bista R, Panta S, *et al.* Intra-articular drain versus no drain after arthroscopic anterior cruciate ligament reconstruction: A prospective comparative study. *J Arthrosc Surg Sports Med* 2023;4:16-9.