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Intra-articular Drain versus No Drain after Arthroscopic Anterior Cruciate Ligament Reconstruction: A Randomized Prospective Clinical Trial

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Background: A significant proportion of surgeons use intra-articular drains after arthroscopic anterior cruciate ligament (ACL) reconstruction. Recent studies have not encouraged the routine use of postoperative drain after arthroscopic surgery.

Objective: The aim of this study is to assess the validity of intra-articular drain use after arthroscopic anterior cruciate ligament reconstruction.

Setting: Orthopedic Department, Salmaniya Medical Complex.

Design: A prospective randomized study.

Method: In this study, forty consecutive arthroscopic ACL reconstruction patients were randomized alternately for either intra-articular suction drain group or non-drain group. All arthroscopic ACL reconstructions using a four strands hamstrings graft as auto graft were included in the trial. The outcome was evaluated in the first three days, first week, fourth week and eighth week. The results were evaluated through pain assessment, range of motion (ROM), and grade of haemoarthrosis[1].

Result: The two groups were comparable in surgical findings and procedures performed. In the first three days, the non-drain group used nearly double the amount of analgesia compared to the drain group. The grade of hemarthrosis was less by one grade in drain group than in non-drain group according to Coupen and Yates grading[1]. However, there were no differences in pain and range of movement at week four or eight. During the study period, there were no complications in either group.

Conclusion: This study showed that pain and hemarthrosis are less in the drain group than the non-drain group. The range of movements is better in the drain group than the non-drain group in the first week.

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Arthroscopically assisted anterior cruciate ligament (ACL) reconstruction has become an established procedure in the past fifteen years[2,3].

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Over the years, the necessity of intra-articular drains has been questioned in the literature[4,5]. However, drains have not been abandoned for the fear of local complications. Several prospective randomized studies have evaluated the use of drains in joint arthroplasty and orthopedic trauma, and the majority show no benefit in using those[4,6,7,8].

Opinions are divided on the routine use of an intra-articular drain following arthroscopic ACL reconstruction. On one hand, some surgeons advocate the use of intra-articular drains as they feel that all cavities must be drained following surgery to decrease the theoretical risk of intra-articular hemarthrosis, adhesions, and joint stiffness[9]. On the other hand, others feel that the use of a drain might increase the risk of infection or cause damage to the graft and articular surface of the knee. Furthermore, patients dislike the pain associated with the removal of drain.

The aim of this study is to assess the validity of intra-articular drain use after arthroscopic anterior cruciate ligament reconstruction.

METHOD

A prospective randomized evaluation of forty patients was performed on the effect of intra-articular drain use in the early postoperative period after primary arthroscopically assisted ACL reconstruction with a four strands hamstring tendon graft. Patients who underwent other reconstructive methods or revision were excluded. Postoperative drain was used alternately. There were 20 patients in each group. All operated knees had a full range of movement (ROM), as compared to the other knee of the same patient.

All procedures were performed by the consultant. A tourniquet was used routinely and the leg was exsanguinated by elevation and a rubber tube. The hamstring tendons (gracilis and semi-tendinosus) were harvested from the ipsilateral leg through a longitudinal antero-medial incision. The tendons were sized and prepared as four-loop grafts. The standard antero-medial and antero-lateral arthroscopic portals and an outlet flow portal in supra patellar pouch were performed in all cases. The remnant of ACL was shaved and no notchplasty was performed. Tibial tunnel was performed according to the size of the graft (8 or 9 millimeters). Femoral tunnel was performed through the tibial tunnel. The graft was secured in the tunnels using bio-absorbable screws.

Full range of movement was confirmed intra-operatively. Occasional impingement on the graft in full extension was corrected. At the end of the operation, a twenty ml of 0.5% lidocaine and 1:100,000 epinephrine was injected into portal sites, knee cavity, graft harvest incision line, and the periosteum where the tendons were stripped. In the drain group, a disposable suction drain (HemoVac) was inserted from the outflow portal and brought to the anteromedial portal. The tourniquet time ranged from 43 minutes to 45 minutes with an average time of the operation of 44 minutes.

In the drain group, the drain was removed on the first postoperative day. All patients underwent standardized rehabilitation supervised by a physiotherapist to emphasize early range of motion, immediate full extension, and weight bearing as tolerated.

The outcome was evaluated in the first three postoperative days, first week, fourth week and eighth week. The results were evaluated through pain assessment (assessed pain scores and

analgesic counts), range of motion (ROM) (assessed by loss of flexion and extension compared to the non operative leg), the grade of hemarthrosis as well as the presence of any complication.

The patients' need for analgesics was recorded in the first three postoperative days and in the first week, fourth and eighth week. The range of motion was measured by the use of a standard handheld goniometer (extension and flexion compared with the contralateral limb). The grade of hemarthrosis was evaluated according to the classification of Coupens and Yates[1] (see Table 1). The need for aspiration and the amount of blood aspirated were also recorded.

Table 1: Clinical Grading of Hemarthrosis (Coupens and Yates)[1]

Grade	Description
0	No detectable fluid
1	Fluid present with wave
2	Fluid palpable in suprapatellar pouch
3	Ballotable patella
4	Tense hemarthrosis

RESULT

Forty patients were enrolled in the study. Twenty patients received an intra-articular drain, and twenty had no drain at the time of surgery.

There were no significant differences between the two group regarding age, sex, activity levels, and time between rupture and reconstruction. No patients were lost to follow up. The patient characteristics were comparable for both groups (see Table 2).

Table 2: Patients' Characteristics

Characteristics	Drain group	Non-drain group
Number of Patients	20	20
Mean Age (years)	27.8	26.3
Sex	All male	All male
Mean time from injury to surgery (months)	22	14
Partial meniscectomy	12	9
Mean time of the surgery and the use of Tourniquet (minutes)	45	44

The data collected is shown in Table 3. The predetermined primary outcome of pain was measured by pills count. In the first three days, the non-drain group used nearly double the amount of analgesia compared to the drain group. The grade of hemarthrosis was less by one grade in drain group than in non-drain group according to Coupen and Yates grading[1]. In addition, there was a necessity to aspirate hemarthrosis in seventeen patients out of the twenty in the non-drain group in the first two days. There were differences in ROM as measured by more loss of last degree of extension in the non–drain group than in the drain group. In the fourth and eighth weeks of follow up, there were no differences between the two groups regarding the three major outcomes of pain, hemarthrosis, and ROM.

Table 3: Results

	Day 1		**Day 2**		**Day 3**		**Week1**		**Week 4**		**Week 8**	
	Drain group	Non-drain group	Drain group	Non-drain group	Drain group	Non-drain group	Drain group	Non-drain group	Drain group	Non-drain group	Drain group	Non-Drain group
Pain												
Pills count	4.3	7.3	3.2	6.1	2.2	4.2	N/A	N/A	N/A	N/A	N/A	N/A
Hemarthrosis												
Grade	2	3	0	3	0	0	0	0	0	0	0	0
Amount aspirated	30. 3	97.6	0	70.3	0	0	0	0	0	0	0	0
Number of patients	3	17	0	13								
Range of movement												
Extension loss(^{o})	4.1	7.3	0	5.2	0	0	0	0	0	0	0	0
Flexion loss(^{o})	N/A	N/A	N/A	N/A	N/A	N/A	18.7	19.2	Full flexion	Full flexion	Full flexion	Full flexion

DISCUSSION

In the first three days, the non-drain group used more analgesic medication than the drain group. The grade of hemarthrosis was less in the drain group than in non-drain group. Seventeen patients out of the twenty in the non-drain group were aspirated for hemarthrosis in the first two days

Many studies reported on the short term and long term results of ACL reconstruction. In contrast, relatively few studies commented on the use of drain, which might not be important to the surgeons but is not so for the patients. Many patients dislike the removal of the drain following surgery. By comparison, repeated aspiration of hemarthrosis in the first three postoperative days (to relieve pain and to get full extension of the knee in the early postoperative period) was found to be more distressing for the patients than the removal of the drain.

McCormack et al did not find supporting evidence for a beneficial effect for the routine use of intra–articular drain after uncomplicated arthroscopic ACL reconstruction[10]. However, they stated that the tourniquet was inflated only at the time of graft harvest, not throughout the whole procedure. This may affect the amount of postoperative hemarthrosis.

Coupens and Yates examined the effect of drain use in a variety of arthroscopic procedures on the knees, which included meniscectomies, retinacular releases, and chondroplasties[1]. Similar to our study, they found that patients who had drains placed postoperatively had less hemarthrosis and 15^{o} greater ROM.

CONCLUSION

This study shows that the use of intra-articular drain post arthroscopic ACL reconstruction reduces the amount of postoperative hemarthrosis and obviates the need of repeated aspiration of the knee. Consequently, the drain reduces pain and improves the range of movement of the knee in the early postoperative period.

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