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Research Article

Drainage in primary cemented total knee arthroplasty required or not? A comparative study among northern Indian subjects

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ABSTRACT

Background: Although there is no established evidence to support the use of drains in total knee arthroplasty (TKA), they are thought to reduce the formation of a haematoma and the incidence of deep infection. The aim of the study was planned to assess the need for drainage after total knee arthroplasty.
Methods: For this comparative evaluation, a total of 100 patients were recruited into two groups. Group A consisted of 50 knees, in which drain was not used after TKA and a control group, group B with 50 knees, in which drain was inserted after TKA. Thus group A was study/ no drain group whereas group B was control/drain group. Pain intensity and analgesic intake were assessed as primary outcome factors. Visual analog scale (VAS) assessed pain intensity. Intake of analgesics was determined. Requirement for dressing reinforcement and the length of hospital stay were also evaluated.
Results: Patients in the study group required approximately three times less opioids than patients in the control group (mean analgesia request amounted 0.16 and 0.45/patient, respectively). Overall mean pain score was higher in group B than in group A. In the study group every patient needed the dressing to be changed at an average 4.6±1.2 times during hospitalization compared with 5.3±1.2 times in the control group. Regarding differences in the pattern in the range of motion and length of hospital stay between the groups, there was no much difference. All the study subjects achieved full extension of the operated knee at discharge.
Conclusions: On the basis of empirical evidences of this study it can be concluded that there is no rationale for the use of drain after primary cemented total knee arthroplasty. Use of drains in after primary cemented total knee arthroplasty has not much to offer.

Keywords: Drainage, Cemented total knee arthroplasty, Drainage, Postoperative

INTRODUCTION

Although there is no established evidence to support the use of drains in total knee arthroplasty (TKA), they are thought to reduce the formation of a haematoma and the incidence of deep infection. In theory, a drain prevents the formation of a haematoma which may impair wound healing, restrict mobilisation and increase the potential for deep infection and pain.[1] Haematomas, however, form

despite the presence of a drain, which may also provide a portal for bacteria.[2,3] In addition, a drain may lead to increased blood loss since the tamponade effect on the joint may be reduced. Several retrospective studies have suggested that wound drainage after joint replacement is not necessary.[4,5]

Some prospective studies have addressed this issue in conjunction with the use of a blood re-transfusion system in order to reduce the rate of post-operative homologous blood transfusions. Some authors found no need for drains, contrary to others.[6,7] Some authors state that drainage evacuates fluid only from a limited area and does not prevent infection if retrograde migration of bacteria occurs. It can also impair the early postoperative rehabilitation.

In a recent meta-analysis, there is no clear advantage of the use of suction drains, apart from reduced need for change of dressing after total knee arthroplasty.[8] Moreover, in patients who had undergone TKA with drainage, the risk of transfusion was higher.[9] The use of drain in joint arthroplasty still remains a matter of controversy. Paucity of quality data provides an opportunity for extension of this debate. Therefore keeping above facts in mind this study was planned to assess the need for drainage after total knee arthroplasty.

METHODS

The present study was carried out in the Department of Orthopedics in collaboration with Department of General Surgery of a tertiary care center in which 100 cases of symptomatic osteoarthritis and rheumatoid arthritis were admitted for primary cemented total knee arthroplasty included in the study. For this comparative evaluation, a total of 100 patients were recruited into two groups. Group A consisted of 50 knees, in which drain was not used after TKA and a control group, group B with 50 knees, in which drain was inserted after TKA. Thus group A was study/ no drain group whereas group B was control/drain group. Both groups were comparable at baseline i.e. in terms of preoperative characteristics.

The indications for TKA were osteoarthritis and rheumatoid arthritis among study subjects. The inclusion criteria laid down for this study were knee arthritis impeding daily activities. Exclusion criteria included significant bone loss that required augmentation, previous thromboembolism and intake of opioids preoperatively. The follow up rates at 6 and 12 months were 100% and 96%, respectively.

Regarding surgical procedure, knee arthrotomy was performed through a midline skin incision and a medial parapatellar capsular incision. Patella was everted. In the control group, drainage was placed intraarticularly. It was removed within first 24 hours postoperatively. Apart from spinal anesthesia 0.25% bupivacaine solution was injected with epinephrine intraoperatively in the joint capsule, rectus femoris tendon and the infrapatellar fat pad in all the patients. Skin was closed with intracutaneous continuous sutures. After surgery all patients were monitored in the recovery room for 24 hours, where the pain was controlled with intravenous morphine pump infusion. Analgesics/opioids were given to combat pain.

All patients received low molecular weight heparin, starting 12 hours before surgery. They also wore compression stockings from the 2nd postoperative day. Antibiotics were administered intravenously 30 minutes before surgery. If the operation had extended, antibiotics were continued up to 3 days. In each case proper knee alignment was restored. Rehabilitation protocol was the same in both groups. On the 1st postoperative day patients stood up with a walker, performed active flexion of the operated knee up to 90°. Exercises with continuous passive motion were commenced. From the 2nd postoperative day, patients were allowed to walk on crutches with full weight bearing as tolerable.

Pain intensity and analgesic intake were assessed as primary outcome factors. Visual analog scale (VAS) assessed pain intensity. Intake of analgesics was determined. Requirement for dressing reinforcement and the length of hospital stay were also evaluated. During hospitalization all patients had dressings covering the site of drain exit in the control group and similar expected site on skin in the study group. All patients were clinically and radiologically evaluated preoperatively, during hospitalization, then at followup, approximately 6 and 12 months after surgery. Radiographs in the anteroposterior and the lateral view were performed using the knee society roentgenographic evaluation system, any radiological findings suggesting prosthesis loosening at postoperative visits were determined.[10] Range of movement of operated knee and complications were examined postoperatively.

The study adhered to the tenets of the declaration of Helsinki for research in humans. Informed consent was obtained from patients after discussion of the advantages and risks. Permission of Institutional ethics committee (IEC) was sought before the commencement of the study. All the questionnaires were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using statistical package for social sciences (SPSS), version 20 (IBM, Chicago, USA). The results were expressed using appropriate statistical methods.

RESULTS

Data of 100 patients recruited equally into two groups, (group A, study/ no drain group; group B, control/drain group) and treated primary cemented total knee arthroplasty to assess the need for drainage after total knee arthroplasty was included in this study.

Intake of analgesics/opioids was comparable between both the groups on the day of surgery to control the pain. From the 1st postoperative day up to discharge, lower demand for opioids in the study group compared with the control group was observed. Patients in the study group required approximately three times less opioids than patients in the control group (mean analgesia request amounted 0.16 and 0.45/patient, respectively) (P=0.03).

Overall mean pain score was higher in group B than in group A. We observed differences in the mean VAS values between both groups but these values were not significant. VAS values followed a declining trend up to discharge (Table 1).

Table 1: Postoperative VAS score among study subjects in two groups.

Day after surgery	VAS Score	
	Study group Group A, study/ no drain group	Control group Group B, control/ drain group
Day 1	4.5	5.5
Day 2	3.5	3.8
Day 3	2.9	3.5
Day 5	2.5	2.8
Day 7	2.2	2.4
Day 10	1.5	1.8

Table 2: Complications developed among study subjects.

Complications	Study groups	
	Group A, (study/ no drain group)	Group B (control/drain group)
	N (%age)	**N (%age)**
Wound related complications		
Prolonged wound healing	3 (6.00)	1 (2.00)
Prolonged healing of injured scar	1 (2.00)	0 (0.00)
Superficial wound infection	0 (0.00)	1 (2.00)
Persistent leg edema	1 (2.00)	2 (4.00)
General complications		
Gastrointestinal hemorrhage	1 (2.00)	0 (0.00)
Respiratory tract infection	1 (2.00)	1 (2.00)
Cerebrovascular accident	0 (0.00)	1 (2.00)
Urinary tract infection	1 (2.00)	2 (4.00)

We observed a significant difference in dressing reinforcement (P=0.04). In the study group every patient needed the dressing to be changed at an average 4.6±1.2 times during hospitalization compared with 5.3±1.2 times in the control group. Each patient had at least three dressing reinforcements. Six patients from the control/drain group required regular dressing changes due to prolonged oozing from the wound after removal of drain.

Regarding differences in the pattern in the range of motion and length of hospital stay between the groups, there was no much difference. All the study subjects achieved full extension of the operated knee at discharge. The knee flexion was comparable between the two groups. Study participants from both groups were discharged after 10 days.

Complications were observed in eight patients from the study group namely; five wound related and three general complications whereas complications were noted again in eight patients equally distributed between control and study groups. No knee required any aspiration (Table 2).

DISCUSSION

Waugh and Stinchfield are the first authors who advocated the use of drains in modern orthopaedics.[1] Most of the recent prospective randomized studies have shown no benefits with its use.[5,11] Nevertheless, according to Chandratreya, 94% of British Orthopedic Association members use drains after TKA in their practice.[12]

Disruption of continuity of skin and deeper tissues along with the application of the drain causes peripheral sensitization, resulting in a decrease of nociceptors threshold. In addition concentration of local inflammatory mediators increases and secondarily induces central sensitization. This two level action causes pain hypersensivity and persistent decrease in the pain threshold at the site of injured as well as surrounding uninjured tissues.[13] Regarding need of analgesics/opioids postoperatively, in this study it was comparable between both the groups on the day of surgery to control the pain. Patients in the study group required approximately three times less opioids than patients in the control group. This is in contrast to some other studies. A study done by Holt observed no statistically significant difference in postoperative opioid consumption after TKA, regardless of the presence of a drain.[14] Another prospective randomised study appraised patients after unicompartmental knee arthroplasty and noted lower analgesic requirements on the 1st postoperative day in patients without drain.[15]

It was observed in this study that a significant difference in dressing reinforcement. In the study group every patient needed the dressing to be changed at an average 4.6±1.2 times during hospitalization compared with 5.3±1.2 times in the control group. Each patient had at

least three dressing reinforcements. A randomized trial observed similar findings after total hip arthroplasty.[16] On the other hand, Ovadia *et al* assessed 58 patients following TKA and found significantly higher serous wound discharge when the drain was not used.[17]

Regarding complications, in this study complications were observed in eight patients from the study group namely; five wound related and three general complications whereas complications were noted again in eight patients equally distributed between control and study groups. No knee required any aspiration. The result of this study is in agreement with previous study from Poland.[18] He observed complications in six patients from the study group namely; four wound related: prolonged wound healing (n = 3), prolonged healing of injured scar (n = 1) and two general: gastrointestinal hemorrhage and respiratory tract infection. There were 11 complications in the control group. We observed four wound-related problems: superficial wound infection (1), prolonged wound healing demanding secondary suture (1), persistent leg edema (2) and seven general: Cerebrovascular accident (1), myocardial infarction (1), erysipelas (1), respiratory tract infection (1), and urinary tract infection (3).

CONCLUSION

Intake of analgesics/opioids was comparable between both the groups on the day of surgery to control the pain. Regarding differences in the pattern in the range of motion and length of hospital stay between the groups, there was no much difference. Thus on the basis of empirical evidences of this study it can be concluded that there is no rationale for the use of drain as we find no significant advantage of using drain after primary cemented total knee arthroplasty. Use of drains after primary cemented total knee arthroplasty has not much to offer.

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