

**Prospective study to compare outcomes of Total Knee Replacement with or without drain**

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**Abstract**

**Introduction:** Closed drainage after total knee replacement (TKR) has been used routinely for many decades, but controversies have arisen in recent years.

The purposes of this study were to compare the clinical outcomes of total knee replacement with or without drain

**Material and Methods:** This prospective randomized study comprising 100 patients (50 patients in each group – group 1 without drain and group 2 with drain) of both gender meeting the inclusion criteria undergoing total knee replacement. Postoperatively patients were followed up for 1 year and outcomes- postoperative pain, percentage drop of hemoglobin, functional outcomes and complications noted and compared.

**Results:** Two groups were comparable in terms of pre-operative characteristics. There was no statistically significant difference in mean pre- and post-operative haemoglobin, average percentage drop of haemoglobin (20.98% in group without drain and 20.25% in group

with drain), blood transfusion requirement, functional status and wound complications in the two groups.

**Conclusion:** There appears to be no clear benefit or drawback of the use of suction drainage after total knee replacement.

**Keywords:** suction drain, TKR, NKSS score

**Introduction**

Total Knee Replacement (TKR) is surgical procedure for treatment of osteoarthritis and moderate to severe rheumatoid arthritis. Primary TKR can result in significant amount of blood loss which often requires post-operative blood transfusion<sup>1</sup>, with some studies reporting blood transfusion requirement to be as high as 30%<sup>2</sup>. Allogeneic blood transfusion carries the risk of disease transmission, various immunological and non-immunological adverse effects and increased medical cost. The use of post-operative drain in TKR is a matter of controversy. Merits of placement of intra-articular

drain is that it prevents hematoma formation and thus bacterial colonization and subsequent infection, decreases tension over the incision (which consequently decreases pain) and accelerate wound healing<sup>3,4</sup>. However, the demerits of use of the suction drain is that it increases bleeding because tamponade effect does not occur at the surgical site, restriction in range of motion and rehabilitation in early post-operative period<sup>3-5</sup>. Some authors state that drainage evacuates fluid only from a limited area and does not prevent infection if retrograde migration of bacteria occurs<sup>6</sup>. In current practice drain in TKR is widely used in Indian setup. However, there are literatures showing no benefits of drain in TKR<sup>7-9</sup>, but that is also not conclusive. So this study was done to compare outcomes {postoperative pain, percentage drop of haemoglobin (Hb), requirement of blood transfusion and wound complications as wound dehiscence, necrosis of wound margin and wound infection (Superficial/deep) within one month and functional status at 3 months and 1 year} of total knee replacement with or without drain.

### **Materials and Methods**

This Study was a prospective, randomized, comparative study, comprised 100 patients (50 patients in each group – group 1 without drain and group 2 with drain) of both genders meeting the inclusion criteria. Inclusion criteria were patients with grade 3 and grade 4 osteoarthritis of the knee after informed written consent. Patients with history of infective pathology, significant bone loss that required augmentation, revision arthroplasties and patients with coagulation disorder or on prior anticoagulant therapy were excluded from the study. Patient selection was done by simple randomization in two groups by using a sealed envelope technique. After appropriate radiological, pre-operative hematological

investigations and functional status assessment using New Knee Society Score (NKSS), the patients were posted for surgery. The surgeries were performed under regional spinal or general anaesthesia as per patient's requirement. The standard surgical steps were followed. In cases of use of drain (Group 2 patients), wound was closed after putting suction drain (14 number Romo Vac) in lateral gutter (Intra-articular) of knee

Post-operative hemogram was done on day 1 and day 3. Postoperative drain output volume was measured daily. Dressing was done on post-operative day 2, 5 and earlier if soakage was present. The drain was removed 48 hours after surgery. Wound examination was done at each dressing. Complications, if any, post-operatively were noted. Patient was discharged after 5-6 days post-operatively according to patient condition.

All the patients were followed up on day 14 and day 30, 3 months and 1 year. In case of any wound complication, more follow up were done accordingly. On first follow up staple removal was done and on each follow up wound was examined for dehiscence, margin necrosis and infection (Superficial/deep), at 3 months and 1-year functional status assessed using New Knee Society Score (NKSS).

### **Outcome measures**

- Postoperative pain using visual analog scale (VAS)
- Percentage drops of hemoglobin postoperatively and requirement of blood transfusion
- Functional status at 3 months and 1 year

Blood transfusion was considered if drain collection of  $\geq 500$  ml (Possible ongoing loss) in 24 hrs. with hemoglobin drop of  $\geq 4$  gm/dl or if total hemoglobin of patient drops to  $< 8$  gm/dl.

**Statistical analysis**

The description of the data was done in form of mean +/- SD for quantitative data while in the form of % proportion for qualitative (Categorical) data. p-values of < 0.05 were considered significant. For quantitative data, unpaired Student’s t-test was used to test statistical significance of difference between two independent group means. For comparison of categorical variables (i. e to examine the associations between qualitative / quantitative variables), chi-square test was used if the number of elements in each cell were 5 or higher and Fisher’s exact test, otherwise. To compare proportions between two groups Z test of proportions was used.

**Results**

The demographics, pre- and intra-operative characteristics of both groups are depicted in Table 1 and both groups were comparable (p>0.05).

Table 1: demographics, pre- and intraoperative characteristics

Variable	Group I	Group 2	p value
Age (years)	65.8±3.2	65.1±4.5	0.37
Male: Female	15:35	18:32	0.54
Preop Hb (gm/dL)	12.3±1.5	12.1±1.4	0.49
Pre op NKSS	102.5±18.2	104.1±17.6	0.66
Tourniquet time (minute)	66.4±2.7	65.5±3.2	0.13
Duration of surgery (minute)	100.2±5.4	101.2±4.5	0.09

Pain as measured on VAS scale increased on day 2 and falls on day 5, but comparable in both groups on any given day (Table 2). Mean hemoglobin measured on day 1 and day 3 depicted in table 2, comparable in both groups and also percentage drop of Hb. Blood transfusion

required in 4 patients in each group. New knee society score shows significant improvement at 3 months and further improved at 1 year in both groups with no significant difference between two groups (Table 1,2).

Table 2: Comparison of Outcomes

Variable	Group 1	Group 2	p value
Pain			
VAS day 1	2.23±0.6	2.4±0.51	0.17
VAS day 2	2.62±0.5	2.8±0.45	0.06
VAS day 5	2.13±0.3	2.21±0.35	0.23
Mean haemoglobin day 1 (gm/dl)	10.62 ± 1.7	10.53 ± 1.62	0.79
Mean haemoglobin day 3 (gm/dl)	9.72 ± 1.72	9.65 ± 1.6	0.72
Average drop of Hb (percentage)	20.98± 10.16	20.25± 9.98	1.00
Blood transfusion requirement	4 patients (8%)	4 patients (8%)	
NKSS at 3 months	180.5±16.2	178.1±18.5	0.49
NKSS at 1 year	191.4±14.4	190.9±15.6	0.87

In the group without drain, one patient developed wound margin necrosis and one patient developed superficial wound infection, both managed conservatively and healed completely. No wound complication was noticed in the group of patients with drain. No deep infection of wound was noted in patients of any group. There was no statistical difference in wound complications between the two groups.

## Discussion

Intra-articular drains have traditionally been used in TKR but its use is controversial. Infection is one of the main complications following TKR and needs immediate consideration. Although suction drain frequently used with rationale of preventing hematoma formation and subsequent infection, it can also lead to significant infection risk due to increased risk of retrograde migration of skin micro-organisms into the surgical site<sup>10</sup>. Recent trend in total knee replacement has inclined towards surgery done without using drains. This method has its advantage like it decreases requirement of blood transfusion and transfusion related complications. There are limited Indian literature<sup>11</sup> suggestive of no benefits of drain uses in TKR but that is also not conclusive. So this study was done to compare outcomes of total knee replacement with or without drain.

Our study had shown the average age of the patients undergoing TKR to be 65.5 years, comparable to study done by Keska R et al<sup>12</sup> in which average age was 68 years. Mean pre-op Hb was similar in the patients between the two groups when tested using independent t-test, 12.3 gm/dl in group 1 and 12.10 gm/dl in group 2 and is comparable to study conducted by Sharma GM et al<sup>11</sup>. In our study, mean post-operative Hb on day 1 and day 3 (as summarized in table 1) was similar in the patients between the two groups when tested using independent t-test, Adal berth G et al<sup>8</sup> study also didn't found any statistical significant difference between their study groups (p value=0.8). Same percentage of patients (8%) in both groups required blood transfusion, very less than in study done by Keska R et al<sup>12</sup> (39% in patients without drain and 53% in patients with drain). This might be because we did meticulous haemostasis on deflation of tourniquet after implantation of femoral and tibial

component, while Keska R et al<sup>12</sup> released tourniquet after compression dressing without doing haemostasis. Our study has shown comparable functional outcome after TKR with or without drain. Recent literature on the use of suction drains post TKR presents a divided opinion, de Andrade et al<sup>13</sup> reported better functional outcome in the postoperative period with the use of drain, whereas Wang et al<sup>14</sup> reported better functional outcome without the use of drain. In the group without drain, one patient developed wound margin necrosis and one patient developed superficial wound infection, both managed conservatively and healed completely. No wound complication was noticed in the group of patients with drain. No deep infection of wound was noted in patients of any group. There was no statistical difference in wound complications between the two groups and also results found comparable to that of the study conducted by Sharma GM et al<sup>11</sup> (1.69%) superficial wound infection rate in both groups.

## Conclusion

No significant difference in blood loss, postoperative pain, functional outcome or wound complications rate was found between the cases with or without drain after total knee replacement, there appears to be no clear benefit or drawback to the use of suction drainage after total knee replacement. However larger randomized multicentric trials with larger sample size and multiple outcomes will further strengthen these findings.

## References

1. Prasad N, Padmanabhan V, Mullaji A. Blood loss in total knee arthroplasty: an analysis of risk factors. *Int Orthop.* 2007; 31:39-44.
2. Cushner FD, Friedman RJ. Blood loss in total knee arthroplasty. *Clinical orthopaedics and related research.* 1991; 269:98-101.

3. Kim YH, Cho SH, Kim RS. Drainage versus non-drainage in simultaneous bilateral total knee arthroplasties. *Clin Orthop Relat Res.* 1998; 347:188-93.
4. Holt BT, Parks NL, Engh GA, Lawrence JM. Comparison of closed-suction drainage and no drainage after primary total knee arthroplasty. *Orthopedics.* 1997; 20(12):1121-5.
5. Esler CN, Blake way C, Fiddian NJ. The use of a closed-suction drain in total knee arthroplasty. A prospective, randomized study. *J Bone Joint Surg Br.* 2003; 85:215-7.
6. Minnema B, Vearncombe M, Augustin A, Gollish J, Simor AE. Risk factors for surgical-site infection following primary total knee arthroplasty. *Infect Control Hosp Epidemiol.* 2004; 25:477–80.
7. Reilly TJ, Gradisar Jr IA, Pakan W, Reilly M. The use of postoperative suction drainage in total knee arthroplasty. *Clin Orthop Relat Res.* 1986; 208:238-42.
8. Adal berth G, Byström S, Kolstad K, Mallmin H, Mil brink J. Postoperative drainage of knee arthroplasty is not necessary: a randomized study of 90 patients. *Acta Orthopaedic Scandinavica.* 1998; 69(5):475-8.
9. Padala PR, Rouholamin E, Mehta RL. The role of drains and tourniquets in primary total knee replacement– A comparative study of TKR performed with drains and tourniquet versus no drains and adrenaline and saline infiltration. *J Knee Surg.* 2004; 17(01):24-7.
10. Drinkwater CJ, Neil MJ. Optimal timing of wound drain removal following total joint arthroplasty. *The Journal of arthroplasty.* 1995; 10(2):185-9.
11. Sharma GM, Palekar G, Tanna DD. Use of closed suction drain after primary total knee arthroplasty—an overrated practice. *SICOT-J.* 2016; 2:39.
12. Kęska R, Paradowski TP, Witoński D. Outcome in primary cemented total knee arthroplasty with or without drain: a prospective comparative study. *Indian journal of orthopaedics.* 2014; 48(4):404-9.
13. de Andrade MA, de Oliveira Campos TV, Silva BF, de Assis ME, de Castro Boechat L, Biondi LF, et al. Six-month follow-up of patients submitted to total knee arthroplasty with and without placement of suction drainage devices. *Rev Bras Or top.* 2015;45(6):549-53.
14. Wang D, Xu J, Zeng WN, Zhou K, Xie TH, Chen Z, et al. Closed suction drainage is not associated with faster recovery after total knee arthroplasty: a prospective randomized controlled study of 80 patients. *Orthop Surg.* 2016;8(2):226-33.