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A Comparative Study of the Outcome of Wound Drain versus No Drain in Patients Undergoing Primary Total Knee Arthroplasty

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Abstract

Total knee arthroplasty (TKA) is a common surgery that reduces pain and significantly improves function and quality of life in patients with knee disorders. Drains in TKR have been used historically for the theoretical benefit of preventing wound hematoma, improving wound healing, and preventing infection. However, literature available to support these beliefs is sparse. The purpose of our study was to assess if a patient undergoing a TKA would benefit from a wound drainage system.

Materials and Methods: Forty-two patients who underwent primary total knee replacement were included in the study; 23 knees in the drained group and 23 knees in the non-drained group. Both the groups had their coagulation workup done and were given deep venous thrombosis prophylaxis as per protocol. A single wound drain system was placed in those patients enrolled in the group with the drains. The outcome was compared between the two groups in terms of blood loss, transfusion requirements, and progression of rehabilitation.

Results: The median drop in Hb was higher in the drained group (2.4 g/dL) compared to the non-drained group (1 g/dL), which statistical analysis was found to be significant ($P < 0.001$). In the drained group, 65.2% of cases required transfusion, whereas only 21.7% of cases in the non-drained group required transfusions. This was found to be statistically significant ($P = 0.01$). There was no significant difference in the visual analog score pain scores between the two groups in the post-operative period ($P = 0.109$). The number of days required to achieve active straight leg raise and knee flexion of 90 degrees was also more in the drained group, which was statistically significant ($P < 0.05$). The number of days taken for suture removal was found to be higher in the drained group (mean = 12.71) versus the non-drained group (mean = 12.04), and this was found to have statistical significance ($P < 0.001$).

Conclusions: In our study, the use of a closed drainage system in total knee replacement was associated with higher blood loss postoperatively which essentially translated to an increased requirement of blood transfusions. The progression of wound healing and achievement of post-operative rehabilitation goals were found to be better in the group without the wound drainage system. Although post-operative pain remained to be the same when compared between both the groups.(Kindly review the sentence as it seems to be incomplete.)

Keywords: Drainage, arthroplasty, total knee arthroplasty, blood transfusion, blood loss, wound healing.

Introduction

Osteoarthritis of the knee in the advanced stages is a painful and debilitating disorder that results in a significant deterioration in the quality of life of patients [1]. Total knee arthroplasty (TKA) constitutes a major advance in the treatment of those patients with severe osteoarthritis [2, 3]. Factors influencing the functional outcome of the TKA were constantly being assessed to achieve the most satisfactory results [4]. The use of wound drainage system was one such component taken into consideration to assess the functional outcome and various other parameters [5].

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Aims & Objectives

This study aims to compare the results of wound drainage using closed suction drain versus no drain in TKA with reference to post-operative blood loss, need for blood transfusion, post-operative pain, wound healing, and progress of rehabilitation.

Discussion

This is a prospective analytical study done during the period between July 2016 and September 2018 in a tertiary care hospital in Bengaluru. The patients who were enrolled in the study were screened as per the inclusion and exclusion criteria laid down by the authors and had consented to the study. Patients aged 18 years and above who underwent primary unilateral

Tabel 1: Comparison of post-operative variables between the two study groups

Variables	Test	Group	Median	Quartiles		P value
				1st	3rd	
Pain D 1	Mann–Whitney U-test	Drained (1)	4	4	5	0.67
		Non -drained (2)	4	4	4	
Pain D 6	Mann–Whitney U-test	Drained (1)	4	3	6	0.109
		Non -drained (2)	4.5	4	6	
Hb drop	Mann–Whitney U-test	Drained (1)	2.4	1.9	2.95	< 0.001
		Non -drained (2)	1	0.8	1.72	
Days to achieve SLR	Mann–Whitney U-test	Drained (1)	8	7	8.5	< 0.001
		Non -drained (2)	5	4.25	6	
Days to achieve 90 flexion	Mann–Whitney U-test	Drained (1)	9	8	10	< 0.001
		Non -drained (2)	7	7	8	

TKA and those who underwent contralateral total knee replacement after a gap of 6 months were included in the study. Patients who underwent revision arthroplasty, with a predisposing bleeding disorder and those who underwent bilateral TKR as a single-stage procedure along with those patients who were lost to follow up were excluded from the study. A total of 42 patients (46 knees) were enrolled in the study as per the inclusion criteria and were divided into two groups with 23 knees based on the utilization of a closed suction drain. All the patients went through the standard pre-anesthetic check involving investigations such a complete hemogram, coagulation profile bleeding time, clotting time, prothrombin time, and activated prothrombin time. Before surgery, an intravenous injection of the antibiotic (Cefoperazone 1 g + Sulbactam 500 mg) and an antifibrinolytic (tranexamic acid 1 g) were administered. The conventional technique to a total knee replacement was proceeded with a medial parapatellar approach with the Vanguard System (Zimmer-Biomet). Before closure, the tourniquet was released, and hemostasis was achieved in both the cases. In the post-operative period, an intravenous injection of the antibiotic Cefoperazone 1 g + Sulbactam 500 mg twice daily with 750 mg of amikacin once a day was administered for 6–8 days followed by an oral antibiotic cefuroxime of dose 500 mg till post-operative day 12. Deep venous thrombosis (DVT) prophylaxis was initiated in the form of injection enoxaparin 40 mg through the subcutaneous route and was continued for a period of 6 days. The epidural catheter was removed on post-operative day 2 maintaining a 6-h window period between the catheter removal and the last DVT prophylactic dose. The drain output was measured on post-operative day 1 and 2, following which drain was removed on post-operative day 2. Wound was inspected for signs of infection on post-operative days 2 and 5. Hemoglobin and hematocrit values were being measured on post-operative days 1, 2, 4, and 6. If the levels were found to be <9 g/dl and packed cells were transfused. The post-operative pain was assessed using the visual analog score (VAS) on a daily basis. Static quadriceps exercise was initiated in the immediate post-operative period. Weight-bearing walking was initiated along with knee exercises on post-operative day 1. Progression of rehabilitation was assessed the time required to achieve quadriceps strength of more than Medical Research Council Grade 3 and knee flexion of up to 90 degrees. Pre-operative and post-operative data collection was done as mentioned above. All statistical analyses were performed using the SPSS version 15.0. Comparisons among means for continuous variables in between two groups were done by independent sample t-test. The level of statistical significance was taken as $P < 0.05$.

Result

Severity of disease

About 58.7% of patients who underwent surgery had Grade 3 osteoarthritic features as per Kellgren-Lawrence grading system [6], compared to 41.3% of patients with Grade 4 disease. There were no surgeries done for patients with Grades 1 and 2 disease.

Post-operative blood loss

The average drain output on the 1st post-operative day was 289.5 ml. On the 2nd post-operative day, the average drain output was 70.1 ml. The post-operative blood loss was assessed by the drop in hemoglobin postoperatively. The median drop in Hb was higher in the drained group (2.4 g/dL) compared to the non-drained group (1 g/dL), which statistical analysis was found to be significant ($P < 0.001$). There was no difference in drainage between the patients who underwent cruciate sacrificing total knee replacement. (Table 1)

Need for blood transfusions

About 41.3% of the patients required blood transfusion in the post-operative period. In the drained group, 65.2% of cases required transfusion, whereas only 21.7% of cases in the non-drained group required transfusions. This was found to be statistically significant ($P = 0.01$).

Post-operative pain

The post-operative VAS pain scores were comparable in both groups on the 1st post-operative day (median = 4). On the 6th post-operative day, the VAS scores were higher in the non-drained group (median = 4.5) versus the drained group (median = 4), but this observation was not statistically significant ($P = 0.109$).(Table 1)

Progress of rehabilitation

The progress of rehabilitation was assessed by the number of days required to achieve active straight leg raise (SLR) and 90 degrees of knee flexion. The number of days required to achieve active SLR was more in the drained group

(median = 8) as compared with non-drained group (median = 5), which was statistically significant (P < 0.001). The number of days required to achieve knee flexion of 90 degrees was also more in the drained group (median = 9) as compared with non-drained group (median = 7), which was statistically significant (P < 0.001).

Wound complications

There were two cases of surgical site infection in the study group belonging to the drained group and no cases of local wound complications in the non-drained group. Hence, the statistical significance of this observation could not be assessed.

Wound healing

The effect of drains on wound healing was assessed by the number of days taken for suture removal. This was found to be higher in the drained group (mean = 12.71) versus the non-drained group (mean = 12.04) and this was found to have statistical significance (P < 0.001) although a mean difference of 0.69 is not practically significant.

Discussion

Total knee replacement is one of the most common orthopedic procedures being done, thus alleviating patients suffering from osteoarthritis of the knee. This has led to an increased effort in research to improve patient safety and outcomes. The use of closed suction drains in knee arthroplasty has been a factor which has been widely discussed. Drinkwater et al. advocated the use of drains to prevent hematoma formation which may serve as a precursor for infection but warned against the prolonged use of a drain (>24 h) [7]. An increased loss of blood and a higher rate of blood transfusions were noted in the group where suction drains were placed which can be explained by the absence of a tamponade effect [8, 9]. The use of a suction drain theoretically should decrease the formation of hematoma, thus having decreased post-operative pain [8]. Esler et al. [10] observed an earlier achievement of physiotherapy goals in the group of patients were suction drain was not being used which was in agreement with our observations although this was in contradiction with observations made by Lee et al. in their study [11]. In our study, there was a delay in wound healing and an increased reporting of wound infections in the group which utilized the drains. This may be due to the various confounding factors which decide the length of hospital stay in a suboptimal setting like ours.

Conclusion

Theoretically, the use of suction drains in knee arthroplasty should be associated with improved wound healing and decreased wound infection. However, in our study, it was observed that non-utilization of a closed suction drain in total knee replacement was associated with better functional outcome and wound healing. There was a decreased requirement of blood transfusions when a drain system was not used.

Limitations

The sample size was small. There is a possibility of interoperator variability due to the surgeries were carried out by multiple surgeons.

References

1. Arden N, Nevitt MC. Osteoarthritis: Epidemiology. Best Pract Res Clin Rheumatol 2006;20:3-25.
2. Ranawat CS. History of total knee replacement. J South Orthop Assoc 2002;11:218-26.
3. Buckwalter JA, Lohmander S. Operative treatment of osteoarthrosis. Current practice and future development. J Bone Joint Surg Am 1994;76:1405-18.
4. Yoo JH, Chang CB, Kang YG, Kim SJ, Seong SC, Kim TK, et al. Patient expectations of total knee replacement and their association with sociodemographic factors and functional status. J Bone Joint Surg Br 2011;93:337-44.
5. Canty SJ, Shepard GJ, Ryan WG, Banks AJ. Do we practice evidence based medicine with regard to drain usage in knee arthroplasty? Results of a questionnaire of BASK members. Knee 2003;10:385-7.
6. Kohn MD, Sassoon AA, Fernando ND. Classifications in brief: Kellgren-lawrence classification of osteoarthritis. Clin Orthop Relat Res 2016;474:1886-93.
7. Drinkwater CJ, Neil MJ. Optimal timing of wound drain removal following total joint arthroplasty. J Arthroplasty 1995;10:185-9.
8. Reilly TJ, Gradisar IA Jr., Pakan W, Reilly M. The use of postoperative suction drainage in total knee arthroplasty. Clin Orthop Relat Res 1986;208:238-42.
9. Cushner FD, Friedman RJ. Blood loss in total knee arthroplasty. Clin Orthop Relat Res 1991;269:98-101.
10. Esler CN, Blakeway C, Fiddian NJ. The use of a closed-suction drain in total knee arthroplasty. A prospective, randomised study. J Bone Joint Surg Br 2003;85:215-7.
11. Lee QJ, Mak WP, Hau WS, Yeung ST, Wong YC, Wai YL, et al. Short duration and low suction pressure drain versus no drain following total knee replacement. J Orthop Surg (Hong Kong) 2015;23:278-81.

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