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USE OF CLOSED SUCTION DRAIN AFTER PRIMARY TOTAL KNEE ARTHROPLASTY: AN OVERRATED PRACTICE

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ABSTRACT

Background: Knee osteoarthritis is a common presentation in an orthopedic setting. The most common procedure of knee is total knee replacement for severe conditions. After surgery, significant bleeding can occur subcutaneously and in intraarticular spaces, necessitating blood transfusions and their associated risks. Sodrain is normally placed after surgery. The use of suction drains in arthroplasties is still controversial. **Objective:** To compare the outcome of total knee arthroplasty with or without closed suction drain placed after surgery. **Material and Methods:** This randomized controlled trial was done at the department of Orthopedic Surgery, Combined Military Hospital, Rawalpindi for about 3 months. Eighty cases; 40 in both groups diagnosed with grade 3 & 4 knee osteoarthritis were enrolled and were randomly divided in two groups. In group A, suction tube was placed. In group B, no suction drain was placed. After surgery, patients were evaluated for drop in hemoglobin level, infection at drain site, pain and range of motion after a week. Patients will be discharged and total hospital stay was noted. Patients were evaluated for WOMAC and Oxford knee score of knee after 3 and 6 months. All the data was recorded in proforma. SPSS v. 22 was used to enter and analyses the data. **Results:** In drain group, the mean age of patients was 65.55 ± 8.63 years. In no drain group, the mean age of patients was 63.30 ± 9.03 years. In drain group, there were 18 (45.0%) male patients and 22 (55.0%) female patients. In no drain group, there were 21 (52.5%) male patients and 19 (47.5%) female patients. After one week of surgery, pain score was 3.70 ± 1.76 with drain and 1.90 ± 1.13 without drain (p-value < 0.05). The range of motion was 64.68 ± 9.39 vs. 69.90 ± 6.69, mean hospital stay of patients was 6.15 ± 1.98 vs. 4.98 ± 1.46 days, WOMAC score was 39.75 ± 5.99 vs. 45.30 ± 6.21 after 3 months, 51.18 ± 5.86 vs. 57.53 ± 7.31 after 6 months, mean Oxford Knee Score was 33.05 ± 5.48 vs. 35.55 ±

5.43 and 40.35 ± 6.29 vs. 43.88 ± 5.29 after 6 months of surgery (p-value < 0.05). **Conclusion:** Thus, there is no use of placing closed suction drains after surgery, however, the outcome was better and improved without drain.

KEYWORDS: *Closed Suction Drain, Primary Total Knee Arthroplasty, Pain, Hemoglobin, Blood Loss, Infection, Hospital Stay.*

INTRODUCTION

Total knee arthroplasty is the most common surgical procedure in orthopedic setting and highly effective and cost-efficient procedure. The need for primary total knee replacement will continue to climb as people live longer. Total knee replacement success and survival are determined by the patient's demographics, surgical technique, and implant-related variables. The current probability of total knee replacement failure needing revision surgery in a ten years span after primary surgery is 5%.[1] Total knee replacement treatments are expected to increase by 673 percent to 3.48 million surgeries in United States through 2030, while revision total knee replacement procedures are expected to increase by 601 percent. Moreover, by 2016, the demand for total knee replacement among patients aged 65 and up is expected to account for more than half of all total knee replacements performed.[2,3] In industrialized countries, an ageing population, growing incidence of risk factors like obesity, and the need to maintain the active lifestyle continues to fuel this inclination.[2,3]

Total knee replacement is the standardized surgical method that has a high success rate in treating severe degenerative osteoarthritis of the knee. After total knee replacement, significant bleeding may occur subcutaneously and in intraarticular spaces, necessitating blood transfusions and its associated complications.[4,5] Drainage is often performed with the aim to prevent hematoma that can impair joint motion and local tissues perfusion, thereby inclining the risk of infection. The drains can thus be utilized to reduce the risk of infection and speed up the healing process after a total knee replacement.[6,7] The debate over whether or not closed suction drainage must be used following total knee arthroplasty is still going on. Comparisons across studies are challenging due to the variety of surgical methods used. The purpose of this study was to compare the benefits of using a closed suction drain vs not using one after a primary total knee arthroplasty when operating after exsanguination (using a rubber Esmarch bandage) with a tourniquet and no type of hemostasis.[8]

So we conducted this trial to confirm whether drain is useful or not. So that in future we can implement the findings of this study in local setting and improve our practice and outcome of knee arthroplasty.

OBJECTIVE

To compare the outcome of total knee arthroplasty with or without closed suction drain placed after surgery.

MATERIALS AND METHODS

This randomized controlled trial was done at the department of Orthopedic Surgery, Combined Military Hospital, Rawalpindi. The study was conducted for about 3 months i.e. from August 2021 to October 2021. Sample size of 80 cases; 40 in both groups were estimated by keeping 95% confidence level, 80% power of the study and mean hospital stay i.e. 5.12±1.65 days without drain while 6.21±1.74 days with drain. All the patients of age 50-80 years, both genders diagnosed with grade 3 & 4 knee osteoarthritis were enrolled in the study who were planned to undergo arthroplasty. Patients with revision arthroplasties, patients who were currently taking anticoagulation treatment and positive for rheumatoid arthritis were not included in the trial. The patients were enrolled from the orthopedic wards. Then informed consent was taken before enrollment in the study by explaining them the pros and cons of both methods. Patients' basic information was obtained including their names, ages, gender, body mass index, duration of osteoarthritis, taking medicine for osteoarthritis, diabetes, and hypertension were noted. Then patients were assessed for WOMAC score and Oxford knee score. Blood sample was taken in vials and sent to the laboratory for assessment of hemoglobin level before surgery. On next day, patients were randomly divided in two groups by using lottery method. In group A, closed suction tube of size 4.8mm was placed at end of surgery in done in routine. In group B, no suction drain was place after surgery and closure of skin was done. All surgeries were performed by researcher with a single surgical team under general anesthesia. Duration of procedure was noted from incision in the skin till closure of skin at the end of surgery. After surgery, patients were moved to post-surgery wards and were followed-up there for about a week. After surgery, standard course of treatment was prescribed including antibiotics to prevent infection, opioids, NSAIDs, vitamin D and calcium supplement. One week after surgery, blood sample was taken in vials and sent to the laboratory for assessment of hemoglobin level and drop in hemoglobin level was calculated. Patients were assessed for infection at drain site. Patients will be discharged when

oral feed started and patient can sit and move mildly with walking stand. Total hospital stay was noted. Patients were evaluated for postoperative pain by using "visual analogue scale", range of motion, WOMAC and Oxford knee score of knee after 3 and 6 months. All the data was recorded in proforma. SPSS v. 22 was used to enter and analyses the data. Independent samples t-test was applied to compare both groups. "P - value ≤0.05" was taken as significant.

RESULTS

In the drain group, mean age of the patients was 65.55 ± 8.63 years. In the no drain group, mean age of the patients was 63.30 ± 9.03 years. In drain group, there were 18 (45.0%) male patients and 22 (55.0%) female patients. In no drain group, there were 21 (52.5%) male patients and 19 (47.5%) female patients. In drain group, the mean body mass index of patients was 27.05 ± 4.51 kg/m^2. In no drain group, the mean body mass index of patients was 25.81 ± 4.76 kg/m^2. In drain group, the mean duration of pain / osteoarthritis in knee joint knee was 10.93 ± 5.61 years. In no drain group, the mean duration of pain / osteoarthritis of knee joint was 9.25 ± 5.73 years. In drain group, 19 (47.5%) patients were taking medication for knee pain due to osteoarthritis while 21 (52.5%) patients were not taking medicines. In no drain group, 18 (45.0%) patients were taking medication for knee pain due to osteoarthritis while 22 (55.0%) patients were not taking medicines. In drain group, 21 (52.5%) patients were diabetic while 19 (47.5%) patients were non-diabetics. In drain group, 20 (50.0%) patients were diabetic while 20 (50.0%) patients were non-diabetics. In drain group, 15 (37.5%) patients were hypertensive while 25 (62.5%) patients were normotensive. In no drain group, 21 (52.5%) patients were hypertensive while 19 (47.5%) patients were normotensive. Table 1

At baseline, the mean hemoglobin level was 13.29 ± 1.31 g/dl in drain group. In no drain group, the mean hemoglobin level was 13.08 ± 1.25 g/dl. After one week of surgery, the mean hemoglobin level was 12.20 ± 1.41 g/dl in drain group. In no drain group, the mean hemoglobin level was 12.01 ± 1.18 g/dl. The mean change in hemoglobin level was 1.08 ± 0.49 g/dl in drain group. In no drain group, the mean hemoglobin level was 1.08 ± 0.45 g/dl. The difference in both groups was insignificant (p-value > 0.05) on each follow-up visit. In drain group, the mean pain score before undergoing surgery was 6.20 ± 1.45 on visual analogue scale while in no drain group, the mean pain score before undergoing surgery was 5.98 ± 1.31 on visual analogue scale. The difference in both groups was insignificant (p-value

> 0.05). In drain group, the mean pain score after one week of surgery was 3.70 ± 1.76 on visual analogue scale while in no drain group, the mean pain score after one week of surgery was 1.90 ± 1.13 on visual analogue scale. The difference in both groups was significant (p-value < 0.05). In drain group, the mean range of motion on flexion after one week of surgery was 64.68 ± 9.39 while in no drain group, the mean range of motion on flexion after one week of surgery was 69.90 ± 6.69. The difference in both groups was significant (p-value < 0.05). In drain group, mean hospital stay of the patients after surgery was 6.15 ± 1.98 days while in no drain group, mean hospital stay of the patients after surgery was 4.98 ± 1.46 days. The difference in both groups was significant (p-value < 0.05). Before undergoing surgery, the mean WOMAC score of patients was 12.50 ± 1.84 in drain group and 12.88 ± 1.65 in no drain group. The difference in both groups was insignificant (p-value > 0.05). After 3 months of surgery, the mean WOMAC score of patients was 39.75 ± 5.99 in drain group and 45.30 ± 6.21 in no drain group. The difference in both groups was significant (p-value < 0.05). After 6 months of surgery, the mean WOMAC score of patients was 51.18 ± 5.86 in drain group and 57.53 ± 7.31 in no drain group. The difference in both groups was significant (p-value < 0.05). Before undergoing surgery, the mean Oxford Knee Score of patients was 9.93 ± 1.40 in drain group and 9.95 ± 1.45 in no drain group. The difference in both groups was insignificant (p-value > 0.05). After 3 months of surgery, the mean Oxford Knee Score of patients was 33.05 ± 5.48 in drain group and 35.55 ± 5.43 in no drain group. The difference in both groups was significant (p-value < 0.05). After 6 months of surgery, the mean Oxford Knee Score of patients was 40.35 ± 6.29 in drain group and 43.88 ± 5.29 in no drain group. The difference in both groups was significant (p-value < 0.05). Table 2

Table 1: Baseline demographics of patients in both groups.

Parameters	Group	
	Drain	No drain
Age (years)	65.55 ± 8.63	63.30 ± 9.03
Gender		
Male	18 (45.0%)	21 (52.5%)
Female	22 (55.0%)	19 (47.5%)
Body Mass Index	27.05 ± 4.51	25.81 ± 4.76
Duration of osteoarthritis of knee	10.93 ± 5.61	9.25 ± 5.73
Taking medication for knee pain	19 (47.5%)	18 (45.0%)
Not taking medicine for knee pain	21 (52.5%)	22 (55.0%)
Diabetes	21 (52.5%)	20 (50.0%)
No diabetes	19 (47.5%)	20 (50.0%)
Hypertensive	15 (37.5%)	21 (52.5%)
Normotensive	25 (62.5%)	19 (47.5%)

Table 2: Comparison of outcome of patients in both groups.

	Group		P-value
	Drain	No drain	
Hemoglobin before surgery	13.29 ± 1.31	13.08 ± 1.25	0.480
Hemoglobin after surgery	12.20 ± 1.41	12.01 ± 1.18	0.510
Change in hemoglobin level	1.08 ± 0.49	1.08 ± 0.45	0.972
Pain before surgery	6.20 ± 1.45	5.98 ± 1.31	0.469
Pain after one week of surgery	3.70 ± 1.76	1.90 ± 1.13	0.000
Range of motion	64.68 ± 9.39	69.90 ± 6.69	0.005
Hospital stay (days)	6.15 ± 1.98	4.98 ± 1.46	0.003
WOMAC at baseline	12.50 ± 1.84	12.88 ± 1.65	0.340
WOMAC after 3 months	39.75 ± 5.99	45.30 ± 6.21	0.000
WOMAC after 6 months	51.18 ± 5.86	57.53 ± 7.31	0.000
Oxford Knee score at baseline	9.93 ± 1.40	9.95 ± 1.45	0.938
Oxford Knee score after 3 months	33.05 ± 5.48	35.55 ± 5.43	0.044
Oxford Knee score after 6 months	40.35 ± 6.29	43.88 ± 5.29	0.008

DISCUSSION

Following total knee arthroplasty, blood loss is another big and serious issue, with the momentous blood loss occurs within few hours after surgery.[9] The cause of that as the tourniquet is deflated; there is an increase in reactive blood flow in the wound. There is a danger of blood loss, which may necessitate a blood transfusion, especially in individuals who have had a drain placed. Various procedures are employed to limit post-operative bleeding in patients who were placed drain, one of which is temporary drain clamping. This approach not only allows for the creation of hematomas later on, but it also allows for tamponade effects, which is necessary to block the dead spaces. The period of drain placement and the time it takes to remove the drain have also been a point of contention in recent years, with the majority of research indicating that initial clamping for 4–6 hours has a superior impact.[10]

The drain should not be left in place for > 48 hours after surgery since it raises the danger of germs migrating backwards. Clamping the drain for an extended length of time is equivalent to not draining the wound.[11] Not using the drain after regular primary total knee arthroplasty is increasingly accepted as part of an improved recovery after surgery programme. The impact of drains on blood transfusion rates and post-surgery hospital stay duration after total knee arthroplasty is, however, debatable.[12]

In a trial, done by Eme et al., using a drain after the primary total knee arthroplasty did not provide any significant benefits, although it did result in higher postoperative blood loss.

When weighing the benefits and drawbacks of using a closed suction drain following total knee arthroplasty based on published data, the operating method must be taken into account, since it has a significant influence on the outcomes.[8]

In our trial, after one week of surgery, pain score was 3.70 ± 1.76 with drain and 1.90 ± 1.13 without drain (p-value < 0.05). The range of motion was 64.68 ± 9.39 vs. 69.90 ± 6.69, mean hospital stay of patients was 6.15 ± 1.98 vs. 4.98 ± 1.46 days, WOMAC score was 39.75 ± 5.99 vs. 45.30 ± 6.21 after 3 months, 51.18 ± 5.86 vs. 57.53 ± 7.31 after 6 months, mean Oxford Knee Score was 33.05 ± 5.48 vs. 35.55 ± 5.43 and 40.35 ± 6.29 vs. 43.88 ± 5.29 after 6 months of surgery (p-value < 0.05).

Sharma et al., found that the mean hospital stay was higher in patients with drain (6.21 ± 1.74 g/dl) than without drain (5.12 ± 1.65 g/dl). The WOMAC was assessed pre-operatively (13.0017 ± 4.3021 vs. 12.3623 ± 4.0016), and at six months (52.8770 ± 9.9231 vs. 52.1593 ± 7.3826) and the Oxford Knee score was also assessed pre-operatively (10.389 ± 3.0739 vs. 10.796 ± 2.8814), and at six months (33.9661 ± 3.8639 vs. 34.48 ± 4.1066). The difference in both groups was insignificant (p-value > 0.05). Thus author concluded that there is no use of drain after knee arthroplasty, as the outcome was similar whether drain was placed or not.[13]

Closed suction drains significantly raised the hazard for the blood transfusion in primary total knee arthroplasties (relative risk = 1.38, 95 percent confidence interval; 1.04--1.83), according to a systematic review and meta-analysis of nineteen randomized controlled trials; we found similar results (odds ratio = 2.812, 95 percent confidence interval; 2.224--3.554 in total knee arthroplasty).[14] Moreover, Bjerke-Kroll et al., found that using a closed suction drain raised the number of blood transfusion in both; unilateral and bilateral primary total knee arthroplasty, presumably due to drain group's greater blood loss.[15]

A suction drain was related to higher total blood loss in total knee arthroplasty in several prior investigations.[15-18] Unseen bleeding can occur in about 60% of total blood loss after total knee arthroplasty, according to studies, with the majority of the blood loss occurring early after surgery.[19,20] When assessing improved recovery after surgery programmes, the length of hospital stay is regarded both a meaningful outcome metric and a non-substitutable signal of excellence.[21]

In many counties, reducing the length of hospital stays, which translates to increased hospital efficiency and production, is a major goal. Shorter hospital stays provide clear advantages for both; patients and hospitals, including reduced utilization of medical resources, considerable cos-effective, and high patients' satisfaction.[22,23] With the introduction of accelerated recovery after surgery programmes, reducing hospital stay has become an important element of reducing hospital stay. Despite the fact that some previous studies found that closed suction drains were not linked to a longer hospital stay, these studies did not recommend routine use of closed suction drains as this empirical practise has no evident benefits for patients undergoing primary unilateral total knee arthroplasty.[14,16,24,25]

CONCLUSION

Thus there is no use of placing closed suction drain after surgery, however, the outcome was better and improved without drain. In future, we can now recommend not to place drain after knee arthroplasty in order to reduce the complications and improve the functional outcome of knee arthroplasty and improve the satisfaction of patients as well as their relatives by achieving more appropriate results.

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