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For what minimum time a drain should be kept after total knee replacement

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Abstract

Background: Closed suction drainage of wounds has been well established as a principle of management following joint arthroplasty. Merits of use of drain is that it prevents hematoma formation at surgical site by evacuating blood from joint space, which is one of the factors responsible for colonization by bacteria causing superficial as well as deep-seated infection. Drains decreases tension over the incision (which consequently decreases pain), reduces ecchymosis and the need for change of dressings, reduces delayed wound healing and also reduces risk of infection. It can also cause retrograde infection if placed for a long time. Therefore, the role of this study was to clarify up to what time period a drain should be placed after total knee arthroplasty to evacuate maximum amount of heamatoma without increasing chances of infection.

Materials and Methods: 57 patients who underwent unilateral or bilateral primary TKA surgeries has been studied for the amount of blood loss in drain during first 12 hrs and after 24 hrs and any kind of wound infection (superficial/deep) within one month of primary TKA surgeries.

Results: On analysis of total cases (57 cases), it was found that the percentage of minimum blood drained was 66% and maximum was 100% with a mean of 88.76% with in first 12 hours. If we do analysis on the basis of blood drained more than 80%, or less than 80% of total blood drained in first 12 hrs, we found that only in 6 cases, the blood drained in first 12 hrs was less than 80%.

Conclusion: So, this has been concluded that the closed suction drain can be removed after 12 hrs without any further significant drainage and without increasing chances of infection.

Keywords: Primary knee arthroplasty, drain, first 12 hrs.

Introduction

Closed suction drainage of wounds has been well established as a principle of management following joint arthroplasty. More recently, the efficacy of this practice has been questioned ^[1, 2]. Merits of use of drain is that it prevents hematoma formation at surgical site by evacuating blood from joint space, which is one of the factors responsible for colonization by bacteria causing superficial as well as deep-seated infection. Drains decreases tension over the incision (which consequently decreases pain), reduces ecchymosis and the need for change of dressings, reduces delayed wound healing and also reduces risk of infection ^[6, 7]. However, demerits of use of drainage system is that it increases bleeding because the tamponade effect does not occur at surgical site increasing requirement of post-operative blood transfusion which in turn increases transfusion related complications ^[8]. It can also cause retrograde infection ^[9]. There is no clear literature whether to use drain or not, as using a drain decreases post op pain by evacuating heamatoma. No clear literature telling, for what minimum time period a drain should be placed to evacuate maximum heamatoma and by decreasing chances of infection. So this study was done to clarify the time period for which drainage system after total knee arthroplasty should be placed to evacuate maximum heamatoma without increasing chances of infection.

Materials and Methods

This retrospective study was carried out at Indian spinal injury centre, New Delhi for a duration of six months on 57 patient.

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Study population compromised of both male and female undergoing unilateral or bilateral primary total knee arthroplasty surgery. Patients with infective pathology, revision TKR, previous operated cases for fractures or deformities around the knee, any coagulative disorder, recent history of thrombo-embolic episode were excluded from the study.

Preoperative protocol: All the drugs containing salicylates and non-steroidal anti-inflammatory drugs (NSAIDS) was stopped 7 days prior to surgery. Surgical procedure Under spinal or general anesthesia (as per patient's requirement) in supine position with a pneumatic tourniquet on the thigh with pressure 150 mm of Hg above the systolic blood pressure knee was opened through standard midline anterior approach and medial parapatellar arthrotomy done Tourniquet was released after cement setting and haemostasis achieved.

After inserting drain in lateral gutter (intra-articular), wound was closed. 12 number Romo Vac (Romsons, India) drain was used. All the surgeries were carried out by same surgical team and implant of a single company only has been implanted in all the patients.

Postoperative protocol: Postoperative CBC was done on day 1. Postoperative drain output volume was measured at 12 hrs and after 24 hrs postoperative. The drain was removed after 24 h of surgery.

Observation and Results

Observation

Hypothesis: The NULL hypothesis under the study is defined as:

There is no significant difference between the percentage of blood drained in first 12 hrs and in total 24 hrs.

Table 1: Analysis of Total 57 Cases

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Perc_12 hrs	57	66	100	88.76	7.320	53.578
Valid N	57					

When calculation on total 57 cases, it was found that the percentage of blood drained was 66% and maximum was 100% with a mean of 88.76%.

Testing Hypothesis: The hypothesis has been tested by one sample t-test, with test value equal to 90.5% blood drained, drained out in first 12 hrs.

Table 2: Testing Hypothesis

	Test Value=90.5					
	T	DF	Sig.(2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Perc_12 hrs.	-1.797	56	.078	-1.74	-3.68	0.20

The test statistics T=-1.797 has been accepted at 95% confidence interval. This implies that the V percentage of

blood drained in first 12 hrs drain is significantly close to 90.5%.

Table 3: Analysis of 51 cases out of 57 cases

	Drain in 1 st 12 Hrs.				
Valid	>80%	51	89.5	89.5	89.5
	<80%	6	10.5	10.5	100
	Total	57	100	100	

It has been observed that in 90% (89.5%) of cases, more than 80% of total blood was drained in first 12 hrs. In the rest 10% (10.5%) of cases, the blood drained was less than or equal to 80% of total blood drained in first 12 hrs.

The graph below depicts the distribution of cases in which the blood drained is above 80% of total blood drained in 24 hrs. The following Table shows the descriptive statistics of percentage of blood drained in first 4 hrs and 12 hrs duration.

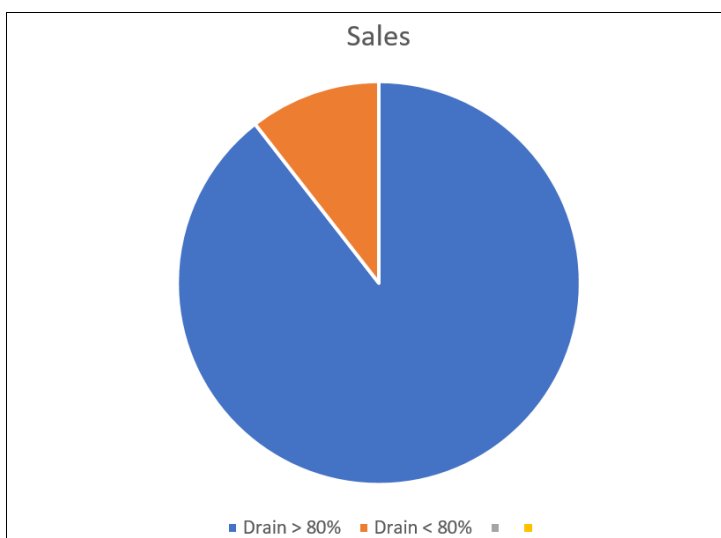


Table 4: Shows the descriptive statistics of percentage of blood drained in first 4 hrs and 12 hrs duration

	N	Range	Minimum	Maximum	Mean	Std. Deviation
PERC_4 HRS	51	71	19	90	60.48	14.987
PERC_12 HRS	51	19	81	100	90.69	4.634

This Table shows that 19 to 90% blood drained has been recorded in first 4 hrs with mean drain of 60.48% (std. dv=14.99). In case of 12 hrs the percent of blood drained ranges from 81 to 100% with mean blood drained of 90.69%

(Std. Dev. = 4.63).

Testing of Hypothesis: The hypothesis has been tested by one sample t-test with test value equal to 92.

Table 5: One sample statistics

	N	Mean	Std. Deviation	Std. Mean Error
Perc_12 hrs	51	90.69	4.634	.049

One Sample Test: Test Value=92

	T	DF	Sig. (P-Value)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Perc_12 hrs	-2.024	50	.058	-1.31	-2.62	-.01

The test statistics $T=-2.024$ has been accepted at 95% confidence level. This implies that the percentage of blood drained is significantly close to 92% in 51 cases in first 12 hrs.

Discussion

Closed suction drainage is viewed as an important tool in postoperative management in most orthopaedic procedure. A difference between evidence and practice is noted when drains are not used. In practice, the majority of surgeons continue drainage for 24 h or more [3].

The main reason given for the use of drain is the fear of hematoma formation. It is the general belief that, by reducing the wound hematoma, the wound complication rate will decrease. Evidence in the literature has demonstrated that it is not the wound hematoma itself, but its inoculation with bacteria that increases the operative morbidity and mortality, a problem that has been clearly associated with drains. Disparity, therefore, is noted between literature and common practice of orthopaedic surgeons as established by the survey [3]. We could not find any study which was suggestive of, what is the exact time of removal of drain, if the drain is used in primary TKA. The duration for which a drain should be used has been studied by a few investigators [4]. They recommend that drains should not be used for more than 24 h. Continued use of drain beyond 24 h increases the incidence of retrograde bacterial migration to the wound site almost logarithmically [4].

In our study, we tried to find out, if drain is used, what is the time, after which it should be removed. This will be indicated by maximum percentage of blood drained in the shortest possible time. We empirically divided the period of blood drained post-op, into 12 hrs and next 12 hrs, assuming that 100 percentage of blood drained in total 24 hrs.

Our hypothesis was that, there was no significant difference between the percentage of blood drained in first 12 hrs and in total 24 hrs.

On analysis of total cases (57 cases), it was found that the percentage of minimum blood drained was 66% and maximum was 100% with a mean of 88.76% (Table 1).

The hypothesis has been tested by one sample t-test with test value equal to 90.5% drain, drained out in first 12 hrs. (Table 2). The test statistics $T=-1.797$ has been accepted at 95% confidence level (Table 2). This implies that the percentage drain is significantly close to 90.5% in first 12 hrs.

If we do analysis on the basis of blood drained more than 80%, or less than 80% of total blood drained in first 12 hrs, we found that only in 6 cases, the blood drained in first 12 hrs was less than 80%, we excluded these extremes and did calculation on rest 51 cases.

This was found, that in 90% of cases more than 80% of blood drained in first 12 hrs and the rest (10% cases), the blood drained was less than or equal to 80% in first 12 hrs. (Table 3). The Table (4) shows that 19 to 90% drain has been recorded in first 4 hrs with mean drain of 60.48% (std. dv =14.99). In case of 12 hrs the percent of drain ranges from 81 to 100% with mean discharge 90.69% (STD. dv=4.63)

The hypothesis has been tested by one sample t-test with test value equal to 92. (Table 5)

The test statistic $t=-2.024$ has been accepted at 95% confidence level. This implies that the percentage of drain is significantly close to 92% in 51 cases in first 12 hrs.

Limitations

However, we feel that the sample size was small; therefore, within the limitations of the study, future research more studies with larger sample size are recommended to further ascertain these findings of our study.

Conclusion

There is no significant difference between the percentage of blood drained in first 12 hrs and in total 24 hrs.

When we did calculation on the basis of 57 cases, the study shows that on an average 90.5% of total blood drained was obtained in first 12 hrs.

When we did calculation on the basis of 51 cases, the study shows that on an average 92% of total blood drained was obtained in first 12 hrs.

By both the above observations, this was seen that more than 90% of total blood drained of 24 hrs was present in first 12 hrs.

So, this has been concluded that the closed suction drain can be removed after 12 hrs without any further significant drainage.

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