

Prospective Study of Surgical Drains and its Neccesasity in Elective Abdominal Surgeries

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ABSTRACT-

Introduction-Drains usage has been used in surgery for many years to prevent the accumulation of bodily fluids and improving body function. The first known use of drains was shown by Hippocrates who applied hollow tubes for the management of empyema. Erasistratus of Alexandria first showed how urinary catheters can be used in surgery while Aurelius Celsius of Rome performed surgeries using lead and brass conical tubes with adjustable plugs for the management of ascites. Claudius Galen also showed usage of leaden tubes for the management of ascites. Drain helps in providing an opening for body fluids, pus-flakes, blood or debrided materials that obstructs with wound granulation or provides a source for bacterial infection. Review of literature shows assessment has been carried out regarding the impact of the drain on individual surgeries eg. Drain or no drain in colorectal surgeries however a collective assessment regarding abdominal surgeries as a whole has not been done. Therefore the objective of this study was to focus the usefulness of the precautionary drainage of peritoneum after abdominal surgeries and to study the duration, the quantity and character of drain and associated various postoperative complications associated with drains, it's complications and comorbidities.

METHODS-All the abdominal surgery cases of both sexes admitted in surgical ward through OPD basis requiring elective abdominal surgeries for various abdominal pathologies will be evaluated with detailed history. It is a cross-sectional study.

DISCUSSION-Drains are associated with higher morbidity & mortality rates, furthermore have indirect effect on the post-operative recovery period of the patients.

CONCLUSION-Drain use may lead to similar wound infections, need for additional open procedures for postoperative complications and quality of life scores versus when compared with no drain use

RESULT-Use of prophylactic drain in abdominal surgeries shows no advantage in helping in reduction of postoperative complications or any other surgical benefit for the same.

KEYWORDS-Drain, non-drain, complications, morbidity, mortality

INTRODUCTION - Drains, its usage and its need have always been a topic of debate. There many in the surgical profession like John yates who believed that the concept of prophylactic intra-peritoneal drainage is not necessary and should be changed with changing times(1), Furthermore they have also openly opined their views but there are also those who wish continue to remain silent on this issue and continue to utilize drain as a safety valve or as a preventive measure due to their consciences rather than any scientific backing for the same(2).

Many variants have been launched over the years but their functions continue to remain the same that is to prevent the accumulation of bodily fluids and thereby improving the hemodynamic status of the patient. Hippocrates(3) was the first one to ever document the use of surgical drains which he used for the treatment of empyema. It was rudimentary but the concept was simple, hollow tubes were used through which collected Pus in the thorax detected via moving the chest and listening for the splashing sounds. The side of the chest with the greatest quantity would be drained first followed by the latter. (4)(5)He rationalized this with a more medicinal approach and thereby began to make a prognosis. Over the years there have been advancements in the field of drains.

However, the opinions have largely been on their personal experiences and the number of variants of drains on the market indicate the fact that none is ideal or universally suitable for use in the field of surgery(6). A lot of factors are taken into be taken into account regarding the non-usage of all-purpose drain.

In the field of surgery, the usage of drains has always been an important component, though the field has expanded into multiple super and sub-specialties, it continues to remain an important modality(7). Initial surgeons came out with different variants of it though rudimentary but it formed the base on which the current models are based.

As many times fear precedes over logic in such decisions. No one will question the need for drainage of unwanted collections, nobody can directly say yes or no to precautionary drain usage and hence we are left with quote of Tait(1) –Whenever there is doubt, the drain is to be put. This illogically logic statement that is still whispered today, but the query will be removed one day.

Surgeon's are using prophylactic drainage on daily basis after abdominal procedures after its advantages were shown by Sims(2). But this theory was rejected by many in the surgical society. Doctors who prefer to use drains argue that drainage of the peritoneum can detect

early problems at a fast rate thus providing an early option in helping improve lives while people who were not in favour say that drainage of the peritoneum is not possible as mentioned by. Hence it is of no use. As quoted by John yates in his paper published in the year 1881 for which he received Senn medal accurately described the issue of peritoneal drainage, the problem that persist even today(8). He concluded that it is not possible to drain the peritoneal cavity completely as it is physiologically and mechanically against the body mechanics to allow the peritoneum to be completely drained.

Drain helps in providing an opening for body fluids, pus/flakes, blood or debrided materials but it also causes obstruction with wound granulation and provides a source for bacterial infection(9).

Regrettably the concept of prophylactic drainage has not been scientifically studied in great detail. So the importance of overall use of the prophylactic drain in abdominal surgeries remains a topic of further study(10).

Despite this, surgeon's still employ prophylactic drain application in abdominal surgeries on regular basis thus adhering to the values of Tait(1).

Hence there continues to remain a dispute regarding the usage of drains. Therefore, the objective of this study was to focus the usefulness of the prophylactic drainage of peritoneum after elective abdominal surgeries.

METHODOLOGY

SOURCE OF DATA:-Department Of General Surgery (Datta Meghe University of Medical Sciences, Wardha, Maharashtra, India)

METHOD OF COLLECTION OF DATA:- All the abdominal surgery cases of both sexes admitted in surgical ward through OPD basis requiring elective abdominal surgeries for various abdominal pathologies will be evaluated with detailed history, examination, pathology, surgical procedure underwent, postoperative course, various complications, duration of hospital stay and follow up till 1 month. All the operated cases for various Intra-abdominal diseases on elective basis were included.

Thus cases taken for comparative study will be distributed into drain group and the rest in non drain group. Study on the basis of surgical site infection associated with drain site infection and post operative recovery period has been done in order to elicitate the study. In Acharya Vinoba Bhave hospital. It is cross-sectional study.

INCLUSION CRITERIA :

All the operated cases for various Intra-abdominal diseases on elective basis were included.

EXCLUSION CRITERIA :

1. Patients with medical co-morbidities
2. Patients <6yrs of age

3. Emergency surgeries

Bias: In order to avoid bias similar surgeries have been carried out and distributed into drain and non-drain group in order to avoid preferences among both the groups. A total of 90 cases were taken for comparative study between July 2018 –July 2020.

DATA ANALYSIS

Processing of the collected data was done using SPSS 16.0. An expository statistical process was done, the frequency, percentage, mean, and standard deviation were calculated for evaluation of co-relation between the parameters, t-test, variance . Outcome was evaluated in 95% confidence interval and $p < 0.05$ significance level.

RESULTS-

Table 1: Age wise distribution of patients in two groups

Age Group(yrs)	Drain	Non Drain	Total	χ^2 -value
≤ 20 yrs	1(2%)	2(5%)	3(3.33%)	4.77 $p=0.44$,NS
21-30 yrs	6(12%)	5(12.50%)	11(12.22%)	
31-40 yrs	10(20%)	13(32.50%)	23(25.56%)	
41-50 yrs	13(26%)	8(20%)	21(23.33%)	
51-60 yrs	10(20%)	9(22.50%)	19(21.11%)	
> 60 yrs	10(20%)	3(7.50%)	13(14.44%)	
Total	50(100%)	40(100%)	90(100%)	
Mean \pm SD	47.10 \pm 13.44	42.85 \pm 14.22	45.21 \pm 13.88	
Range	16-68	11-74	11-74	

- In the present study of 90 patients, it was observed that the mean age of presentation was 45.21 \pm 13.88 (11-74 years), the youngest patient being 11 years old and the oldest patient being 74 years old.

Table2: Gender wise distribution of patients in two groups

Gender	Drain	Non Drain	Total	χ^2 -value
Male	34(68%)	29(72.50%)	63(70%)	0.21 $p=0.64$,NS
Female	16(32%)	11(27.50%)	27(30%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study, it was observed that out of 90 cases studied 63(70%) were male patients and 27(30%) were female patients. Data was distributed in a randomized manner.

Table3: Distribution of patients in two groups

	No of patients	Percentage
Drain	50	55.56
Non Drain	40	44.44
Total	90	100

- Our study, total number of patients (90) were divided into drain & non-drain group. The drain group had 50(55.56%) patients while the non-drain group had 40(44.44%) patients.

Table 4: Distribution of patients in two groups according to type of surgery

Type of surgery	Drain	Non Drain	Total	χ^2 -value
Abdominal Wall	9(18%)	9(22.50%)	18(20%)	4.89 p=0.67,NS
Upper gastrointestinal	6(12%)	4(10%)	10(11.11%)	
Appendicular Surgery	2(4%)	5(12.50%)	7(7.78%)	
Hepatobilliary surgery	6(12%)	6(15%)	12(13.33%)	
Pancreatic	6(12%)	5(12.50%)	11(12.22%)	
Splenic	4(8%)	4(10%)	8(8.89%)	
Colorectal	10(20%)	4(10%)	14(15.56%)	
Urological	7(14%)	3(7.50%)	10(11.11%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study total, 90 patients were observed which were divided into 8 groups depending upon the type of surgery they underwent. The majority of patients underwent abdominal wall surgeries 18(20%) followed by colorectal surgeries 14 (15.56%), Abdominal wall surgeries 18(20%), Upper gastrointestinal surgeries 10(11.11%), Appendicular surgeries 7(7.78%), Hepatobiliary surgery 12(13.33%), Colorectal surgeries 14(15.56%), Pancreatic 11(12.22%), Splenic 8(8.89%), Urological 10(11.11%).

Table 5: Correlation between drainage(quantity) and type of surgery

Drainage	Type of surgery								
	Abdominal Wall	Upper gastrointestinal	Appendicular Surgery	Hepatobilliary surgery	Pancreatic	Splenic	Colorectal	Urological	Total
≤20 ml	5	0	1	3	1	1	4	1(6.25%)	16

	(31.25%))	(0%)	(6.25%))	(18.75%))	(6.25%)	(6.25%)	(25%))	(32%)
20-30 ml	4 (28.57%))	3 (21.43%))	1 (7.14%))	1 (7.14%)	2 (14.29%))	0 (0%)	1 (7.14%))	2 (14.29%))	14 (28%)
30-40 ml	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (25%)	1 (25%)	1 (25%)	1 (25%)	4 (8%)
>40 ml	0 (0%)	3 (18.75%))	0 (0%)	2 (12.50%))	2 (12.50%))	2 (12.50%))	4 (25%)	3 (18.75%))	16 (32%)
Total	9 (18%)	6 (12%)	2 (4%)	6 (12%)	6 (12%)	4 (8%)	10 (20%)	7 (14%)	50 (100%))
χ^2 -value	19.78, p-value=0.535, Not Significant								

- The different characters of drains in different surgeries were recorded.

Table 6: Distribution of patients according to drainage quality.

Drain Quality	No of patients	Percentage
Serous	19	38
Sero-Sanguinous	15	30
Hameorrhagic	13	26
Pseudocyst Fluid	3	6
Total	50	100

Table 7: Distribution of patients in two groups according to length of hospital stay

Length of hospital stay	Drain	Non Drain	Total	χ^2 -value
0-10 days	4(8%)	11(27.50%)	15(16.67%)	7.60 p=0.10, NS
11-20 days	19(38%)	14(35%)	33(36.67%)	
21-30 days	21(42%)	12(30%)	33(36.67%)	
31-40 days	4(8%)	3(7.50%)	7(7.78%)	
41-50 days	2(4%)	0(0%)	2(2.22%)	
Total	50(100%)	40(100%)	90(100%)	
Mean \pm SD	22.20 \pm 9.61	17.22 \pm 8.49	19.98 \pm 9.41	

- In the present study of 90 patients, the mean length of hospital stay in the drain group was 22.20 \pm 9.61 days with 42% of patients seen in the drain group between 21-30 days. While in the non-drain group it was 17.22 \pm 8.49 days with 35% patients seen in the non-drain group between 11-20 days. p=0.10 which is statistically insignificant

Table 8: Distribution of patients in two groups according to wound site infection

Wound site infection	Drain	Non Drain	Total	χ^2 -value
Yes	10(20%)	5(12.50%)	15(16.67%)	0.90 p=0.34,NS
No	40(80%)	35(87.50%)	75(83.33%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study conducted on 50 patients in the drain group, (20%) of patients had wound site infection, while among the 40 non-drain patients only (12.50%) of patients had wound site infection. P-value is 0.34 which is statistically insignificant

Table 9: Distribution of patients in two groups according to septic infection

Septic infection	Drain	Non Drain	Total	χ^2 -value
Chest Infection	1(2%)	0(0%)	1(1.11%)	5.42 p=0.24,NS
Fever	0(0%)	1(2.50%)	1(1.11%)	
Pleural Effusion	4(8%)	0(0%)	4(4.44%)	
Septicaemia	4(8%)	3(7.50%)	7(7.78%)	
Not Any	41(82%)	36(90%)	78(86.67%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study, out of 50 patients in the drain group, septicemia & pleural effusion were the commonest postoperative complication seen 4(8%) each. While in the non-drain group of 40 patients 7.50% of patients had developed septicemia. In terms of comparison between both the groups had collaborated p value =0.24 which was statistically not significant. Our study data was compared to the following studies as mentioned below.

Table 10: Distribution of drain patients according to drain site conditions

Drain site conditions	No of patients(n=50)	Percentage
Drain site discharge	8	16
Drain site infection	5	10
Drain site discomfort	14	28

- In the present study as per the data recorded Among 50 patients of the drain group, 28% of patients had drain site discomfort. Drain site infection & discharge was noted in 10% & 16% respectively. The data collected was compared to similar studies focusing on the impact of drain on the overall comfort and local site infection associated with drains as mentioned above.

DISCUSSION

Demographic Features

The present study “Evaluation of importance of drains in elective abdominal surgeries” was conducted in the Department of General Surgery at Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital Sawangi (Meghe), Wardha from July 2018 to October

2020.Total 90 Patients were enrolled into this study period after obtaining clearance from the ethical committee and duly obtaining the consent from the patients were studied prospectively.

In our study maximum number of patients i.e. 23 were in the age group of 31-40yrs, the mean age of presentation was 45.21 ± 13.88 (11-74 years) with the youngest patient being 11 years old and the oldest patient being 74 years old. Our study data was compared to the following studies as mentioned above-

STUDIES	NO. OF PATIENTS (n)	MEAN PRESENTATION
Imad Wajeh Al-Shahwany et al 2012(11)	84	27±12YEARS
Chi-Leung Liu et al 2004(12)	106	53.2 ± 1.4YEARS
<u>Aristithes G Doumouras et al 2017(13)</u>	142,631	44.7 ±12.0 YEARS
<u>Salamat Khan et al 2015(14)</u>	171	35.57 ± 16.42 YEARS
Jack Hoffmann Et Al 1986(15)	70	72 YEARS
Present study	90	45.21±13.88

In our present study, 63(70%) were male patients and 27(30%) were female patients. Data was distributed in a randomized manner giving the M: F ratio of 2.33:1. Our findings were similar to **Imad Wajeh Al-Shahwany et al 2012(11)**&**Chi-Leung Liu et al 2004(12)** , the males predominance is more as compared to females. However, There was a exception in the case of the study conducted by **William E. Fisher et al 2011 (16)** where the female patients were in a greater majority as compared to our study.

STUDIES	NO. OF PATIENTS	MALE	FEMALE
Imad Wajeh Al-Shahwany et al 2012(11)	84	62(73.8%)	22(26.2%)
Chi-Leung Liu et al 2004(12)	104	86 (83%)	18 (17%)
William E. Fisher et al 2011(16)	226	97(43%)	129 (57%)
<u>Salamat Khan et al 2015(14)</u>	171	116(67%)	55(32.1%)
Present study	90	63(70%)	27(30%)

In our study, patients (90) were divided into drain & non-drain group. The drain group had 50(55.56%) patients while the non-drain group had 40(44.44%) patients. Data was distributed in a randomized manner. It was similar to Studies conducted by **Imad Wajeh Al-Shahwany et al 2012** (11) who had 54.76% in the drain group and 45.24% patients in non-drain group and **Zhen Wang et al 2015**(17) who had 51.16% patients in drain group & 50.595% patients in non-drain group. Other studies as mentioned in the chart below have a similar pattern of distribution. There was a exception in the case of the study conducted by **William E. Fisher et al 2011** (16) where the ratio was 79 :21% respectively,

STUDY	NUMBER OF PATIENTS (n)	DRAIN	NON-DRAIN
Imad Wajeh Al-Shahwany et al 2012 (11)	84	46(54.76%)	38(45.24%)
Zhen Wang 2015 (17)	438	220(51.16%)	218(50.69%)
Chi-Leung Liu 2004 (12)	104	52(50%)	52(50%)
William E. Fisher 2011 (16)	226	179 (79%)	47(21%)
Yao Cheng et al 2016 (18)	711	358(50.3%)	353(49.6%)
Petrowsky et al 2004 (19)	1390	717(51.5%)	673(48%)
Present study	90	50(55.56%)	40 (44.44%)

STUDIES	Present study	Wajeh Al-Shahwany et al 2012(11)	William E. Fisher 2011(16)	Petrowsky et al 2004 (19)	Zhen Wang 2015(17)	Chi-Leung Lin et al 2004(12)	Guilherme Godoy 2011(20)	Yao Cheng et al 2016(18)	Vecchio et al 2015(21)	Cavaliere Dat el2019(22)
Upper abdominal wall	18									
Appendicular	7	84	-	-	-	-	-	-		
Pancreatic	11	-	226	-	-	-	-	711		
Upper gastrointestinal	10	-	-	1390	438	-	-	-		
Hepatobiliary surgert	12	-	-	-	-	104		-		
Splenic	-8	-	-	-	-	-	-	-	2009	
Colorectal sx	14	-	-	-	-	-				1702
Urological sx	10	-		-	-	-	512	-		

Distribution of patients according to type of surgery.

In our study total, patients were randomly divided into 8 groups depending upon the type of surgery they underwent.

In present study the majority of patients underwent abdominal wall surgeries 18(20%)

In present study 14 (15.56%) underwent colorectal surgeries.

In present study Upper gastrointestinal surgeries was carried on 10(11.11%).

In present study Appendicular surgeries was carried on 7(7.78%).

In present study Hepatobiliary surgery was carried out on 12(13.33%).

In present study Pancreatic surgeries 11 was carried on (12.22%).

In present study Splenic surgeries was carried on 8(8.89%).

In present study Urological surgeries was carried on 10(11.11%).

The data was compared to Studies that were carried on individual types of surgeries and their results were analyzed and incorporated into our study. Imad **Wajeh Al-Shahwany et al 2012**(11) carried out his study on appendicular surgeries while William E Fisher 2011 (16)carried out his study focusing on pancreatic surgeries. There were other studies that were carried out as well like **Petrowsky et al 2004** (19)& **Zheng Wang et al 2015**(17) who focused their studies on Gastrointestinal surgeries. While **Guilherme Godoyet et al 2011**(20) focused on urological studies ,**Yao cheng et al 2016** did his study in pancreatic surg

Correlation between drainage(quantity) and type of surgery.

In our present study, 25% of colorectal surgeries had an average drain quantity of >40ml. 18.75% of urological surgeries had an average drain amount of >40ml.

In our present study, 25% of colorectal surgeries, urological surgeries, splenic surgeries & pancreatic surgeries had an average drain quantity of 30-40ml.

In our present study, 28.57% of abdominal wall surgeries had an average drain quantity of 20-30ml. 21.43%% of upper gastrointestinal surgeries had an average drain amount of 20-30ml.

In our present study, 31.25%% of abdominal wall surgeries ,25% of colorectal surgeries & 18.75% of hepatobiliary surgeries had an average drain quantity of <20ml.

DRAIN QUANTITY	TYPE OF SURGERY
>40ml	1)25% Colorectal surgeries 2) 18.75 % Urological surgeries
30-40ml	25% -1.1) Colorectal surgeries 1.2) Urological surgeries 1.3) Splenic surgeries 1.4)Pancreatic surgeries
20-30ml	1) 28.57% -Abdominal wall surgeries 2) 21.43%-Upper gastrointestinal surgeries

<20ml	1) 31.25%- Abdominal wall surgeries 2) 25%- Colorectal surgeries 3) 18.75%-Hepatobiliary surgeries
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STUDIES	SURGERY	DRAIN AMOUNT
Bawahab et al 2014 (23)	Hepatobiliary Surgery	49.84 ± 34.30 mL
Dr RN patil et al 2017 (24)	Colrectal surgeries	47.14ml

Bawahab et al 2014 (23) carried out a study on Hepatobiliary surgery where the average amount of drain was 49.84 ± 34.30ml while **Dr RN patil (24)** et al 2017 studies on colorectal surgeries showed the average drain amount to be 47.14ml.

Distribution of patients according to character of drain output-

In our present study, 19(38%) % of patients had Serous discharge in their drains.

In our present study, 15(30%) % of patients had Serou-sanguinous discharge in their drains.

In our present study, 13(26%) % of patients had Hemorrhagic discharge in their drains.

In our present study, 3(6%) % of patients had Pseudocytic Fluid in their drains.

Drain Quality	No of patients (N)	Percentage
Serous	19	38
Sero-Sanguinous	15	30
Hemorrhagic	13	26
Pseudocytic Fluid	3	6
Total	50	100

STUDIES	NO. OF PATIENTS (N)	DRAIN QUALITY
Bawahab et al 2014 (23)	104	Sero-Sanguinous

Bawahab et al 2014 (23) carried out a study on Hepatobiliary surgery where the drain quality was Sero-sanguinous in quality.

Distribution of patients according to length of hospital stay

In our present study of , the mean length of hospital stay in the drain group was 22.20 ± 9.61 days with 42% of patients seen in the drain group between 21-30 days. While in the non-drain group it was 17.22 ± 8.49 days with 35% patients seen in the non-drain group between 11-20 days. $p=0.10$ which is statistically insignificant.

Other studies by **Lewis et al 1990** (25) showed that the hospital stay was 5.9 ± 2 days in the drainage group while 5.5 ± 2 days in the non-drain group. Another similar study carried out by **Saad et al 1993** (26) showed that the comparison between the drainage group as compared to the non-drain group was not significant.

In our study, as compared to other studies, most patients remained in the hospital for a longer stay as in all major cases, the patients were asked to stay until their suture removal and in some cases for post-operative rehabilitation as well.

STUDY	NUMBER OF PATIENTS	LENGTH OF HOSPITAL STAY IN DRAIN GROUP	LENGTH OF HOSPITAL STAY IN NON-DRAIN GROUP	P VALUE
Dr Prashant Raj Pipariya et al 2018 (27)	200	8.38 +/- 1.86 days	4.68 +/- 1.25 days	Insignificant
Imad Wajeh Al-Shahwany et 2012 (11)	84	2 days +/- 12 hours	1 day +/- 12 hours	Insignificant
Cheng Y et al 2015 (28)	711	14.3 days	13.8 days	Insignificant
Bawahab et al 2014 (23)	104	4.48 +/- 2.18 days	2.5 +/- 2.2 days	Insignificant
Adnan Narci et al 2007 (29)	226	10.2 days	8.3 days	Insignificant
Present study	90	22.20 ± 9.61 days	17.22 ± 8.49	Insignificant

Distribution of patients according to wound site complications-

In our present study conducted on 50 patients in the drain group, (20%) of patients had wound site infection, while among the 40 non-drain patients only (12.50%) of patients had wound site infection. P-value is 0.34 which is statistically insignificant. The results of this study were similar to the studies conducted by **Cheng Yet al 2016** (18) & **Bawahab et al 2014**(23). However there were exceptions from the results differed from our studies conducted by **William E. Fisher et al 2011**(16)

STUDIES	NO.OF PATIENTS	WOUND SITE COMPLICATIONS (DRAIN GP)	WOUND SITE COMPLICATIONS (NON-DRAIN GP)
Cheng Yet al 2016 (18)	711	12.3%	13.3%
Imad Wajeh Al-Shahwany et 2012(11)	84	39.13%	36.84%
Bawahab et al 2014(23)	104	2.6%	1.54%
William E. Fisher et al 2011(16)	226	12%	2%
Dr Prashant Raj Pipariya et al 2018(27)	200	7%	1%
Adnan narci et al 2007 (29)	226	28.4%	16.2%
Present study	90	20%	12.50%

Distribution of patients according to systemic infection-

In our present study, septicemia & pleural effusion were the commonest postoperative systemic complication seen in 4(8%) in patients of drain group.

In our present study, septicemia was the commonest postoperative systemic complication 7.50% seen in patients of drain group

Similar to our study, other studies such as **Chi-Leung Liu et al 2004(12)& Jack Hoffmann et al 1986 (15)** had similar percentages among the drain and non-drain group.

STUDIES	NO. OF PATIENTS TAKEN	DRAIN GROUP	NON-DRAIN GROUP
Chi-Leung Liu et al 2004(12)	104	11.5%	11.5%
William E. Fisher 2011(16)	226	2%	0
Jack Hoffmann Et Al 1986 (15)	70	8.5%	11%
Dr RN patil et al 2017(24)	60	3.3%	0
Present study	90	8%	7.50%

Distribution of drain patients according to drain site complications-

- In our present study 28% of patients had drain site discomfort. Drain site infection & discharge was noted in 10% & 16% respectively. The findings were similar to

studies³⁰ carried out by **Chi-Leung Liu et al 2004(12)**.

STUDIES	NO.OF PATIENTS TAKEN	DRAIN SITE COMPLICATIONS
Rn patil et 2018(24)	60	14% Drain site discomfort & 14.28% had Drain site infection
Chi-Leung Liu et al 2004(12)	106	44.2% cases had drain site discharge & 7.7% case had drain site infection
Jack Hoffmann Et Al 1986(15)	70	3.5% Drain site discharge
Present study	90	28% of patients had drain site discomfort. Drain site infection & discharge was noted in 10% & 16%

Few of the related studies were reviewed (29-31). Different studies on various kind of abdominal surgeries were reported by Saranya et. al. (32), Shiras et. al. (33) and Yeola et. al. (34,35). Jindal et. al. (36) and Fulzele et. al. (37) reflected on related problems.

CONCLUSION

- In spite of the ritual of putting a drain which was thought to help in detecting complications early, the drains on the contrary have been associated with loco-regional disease and prolonged post-operative recovery.
- Even though drains were put in order to reduce complications, there has been no significant differences in terms of the overall surgical outcome as compared to not putting one.
- To conclude, the concept of prophylactic drain usage should be reconsidered for the overall improvement of the patients.

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Conflict of Interest: There are no conflicts of interests.

Informed consent: Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Data and materials availability: All data associated with this study are present in the paper and/or the Supplementary Materials.

Footnotes

Source of support: Nil

Conflict of Interest: None declared.

Ethical approval for human

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable

Ethical approval

The study was approved by the Medical Ethics Committee of Datta Meghe Institute of Medical Sciences, Deemed University (Ethical approval Ref.No. DMIMS (DU)/IEC/2018-19/7448).

Data and materials availability

All data associated with this study are present in the paper.

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