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ORIGINAL RESEARCH

Evaluating the Efficacy, Indications, and Complications of Prophylactic Drainage in Abdominal Surgery: A prospective observational study

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ABSTRACT

Background: Abdominal surgery remains a cornerstone in the management of various medical conditions, ranging from elective procedures to emergency interventions. Among the pivotal considerations in the postoperative management of these cases is the utilization of prophylactic drainage, a practice aimed at reducing the risk of complications such as intra-abdominal collections and infections. **Materials & Methods:** This prospective observational study was conducted at R.D. GARDI MEDICAL COLLEGE, UJJAIN, from February 2022 to January 2023.The study population comprised 100 patients admitted to the Surgery ward for abdominal surgeries,The study participants divided into two groups: Drainage Group (80 patients) and Non-Drainage Group (20 patients). The Drainage Group was further subdivided into Tube Drain (70 patients) and Corrugated Drain (10 patients). **Results:** Among the drained patients, post-operative pyrexia and wound infection incidences are higher compared to the undrained group. Notably, a significant difference in post-operative hospital stay duration is not observed between the two groups, although variability is noted within the drainage group. **Conclusion:** The study underscores that while drains may be associated with higher rates of post-operative pyrexia and wound infection, they do not significantly impact the duration of post-operative hospital stay. These findings suggest a need for cautious consideration of drain placement in abdominal surgeries, weighing potential benefits against the risk of complications. Further research may elucidate optimal strategies for drain management in abdominal surgical contexts.

Key words: Abdominal drain, post-operative, surgery, complications

INTRODUCTION

A lot of physicians in the past agreed on the importance of using prophylactic abdominal drainage after surgical operations, such as Theodor Bill Roth (1829–1894), who was convinced that the use of prophylactic drainage after gastro-intestinal operations was beneficial, the famous American physician William Halsted who proclaimed that the use of drains is necessary only in operations where the surgeon is not certain of the quality of the procedure. And the famous 19th-century Scottish gynaecologist Robert Lawson Tait who also said that "if in doubt, drain"[1,2] A study published in the United States of America confirmed that more than 90% of surgeons have used drainage after cholecystectomy.[3]

But in recent times, a concern has been raised about placing a prophylactic drain inside the abdominal cavity, considering it is a foreign body, and there was a big question mark whether it may increase the possibility of infection. Numerous clinical trial studies and systematic reviews have showed the ineffectiveness of routine use of prophylactic drain. [4,5]

However, in recent years, this widespread practice has been abandoned as a routine part of many operations, such as cholecystectomy[6], pancreatic surgery[7], and standard bowel resections[8]. Innovations in imaging techniques and advancements in various diagnostic tests have made it possible to identify fluid collections without a prophylactic drain.

Among the pivotal considerations in the postoperative management of these cases is the utilization of

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prophylactic drainage, a practice aimed at reducing the risk of complications such as intra-abdominal collections and infections. However, the efficacy and indications of prophylactic drainage in abdominal surgery have been subjects of ongoing debate within the medical community.Surgical skills may vary for different centre and this may influence on the placement of drainage and postoperative complications.[9]Evidence against the use of prophylactic drain after gastrectomy are increasing and ERAS guidelines suggest the benefit of drain avoidance.[10]The incidence of stoma-related complications seems to increase with the time to ileostomy closure[11]

This prospective observational study endeavours to delve into the multifaceted aspects of prophylactic drainage in abdominal surgery, focusing on its efficacy, indications, and associated complications. By systematically evaluating these factors, we aim to provide valuable insights into the optimal utilization of prophylactic drainage, thereby enhancing patient outcomes and refining surgical practices.

MATERIALS & METHODS

This prospective observational study was conducted at R.D. GARDI MEDICAL COLLEGE, UJJAIN, spanning from February 2022 to January 2023.The study population comprised 100 patients admitted to the Surgery ward for abdominal surgeries, following approval from the hospital ethics committee. Block randomization was employed, and patients were included in the study after obtaining approval from the institutional Research Guidance Committee and Institutional Ethics Committee. Informed consent was obtained. Inclusion criteria encompassed patients undergoing midline abdominal laparotomies for benign or malignant gastrointestinal pathologies requiring drain placement, regardless of elective or emergency presentation, and spanning all age groups. Exclusion criteria consist of patients with drains placed outside the abdominal cavity and those who did not provide written informed consent.

The study participants divided into two groups: Drainage Group (80 patients) and Non-Drainage Group (20 patients). The Drainage Group was further subdivided into Tube Drain (70 patients) and Corrugated Drain (10 patients). History was taken. Comprehensive patient assessment was conducted pre-operatively, including medical history, vital signs monitoring, and laboratory investigations. Data collection encompassed various parameters such as patient demographics, preoperative findings, final diagnosis, operative details, drainage placement, indications for drain placement, drain type, drain site, drainage volume, drain site culture, abdominal ultrasound findings, drain removal details, and wound condition upon drain removal. Statistical analysis involved evaluating qualitative and quantitative data through measures such as mean, median, mode, standard deviation, and t-test to determine statistical significance or association.

OBSERVATION AND RESULTS

In this study patients were included from both elective and emergency operations for various intra-abdominal conditions. All patients who underwent abdominal surgery were grouped as follows:

1. Drainage Group
2. Non-Drainage Group

Drainage Group was further divided in to

1. Tube Drainage
2. Corrugated Drainage.

Patients were assessed intra-operatively for indication of drainage and post-operatively for amount of drain, intra-peritoneal collections, drain site infections, complications associated with and without drainage and type of drainage, mean duration of stay in hospital for drainage and non-drainage group and tube and corrugated drainage group.

AGE: Patients <50yr were 56 and >50 were 44. Age hasnosignificance in both Drainage and non-drainage group.Age distribution analysis showed that out of 100 patients, 80 had drains while 20 did not. Among patients under 50 years old, 29.6% did not have drains, whereas in patients over 50, only 8.7% did not have drains as shown in Table 1.

GENDER: Gender distribution was as follows: 76% were male and 24% were female, with no significant difference between the drainage and non-drainage groups.

Table 1- Distribution between age-group and drain/without drain patients

Age Group		Without Drain	Drain	Total
≤ 50 years	No. of patients	16	38	54
	Percentage %	29.6%	70.4%	100%
>50 years	No. of patients	4	42	46
	Percentage %	8.7%	91.3%	100%
Total	No. of patients	20	80	100
	Percentage %	20%	80%	100%

Drain: Out of 80 drained patients, Corrugated drain was placed in 10 patients and Tube drain was placed in 70 patients as shown in Table 2

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Table 2: Distribution between type of drains

Drainage Patients	Type of Drains		Total
	Corrugated	Tube	
No. of Patients	10	70	80
Percentage %	13	87	100%

Culture: We had selected random 40 patients with drain for drain site culture as shown in Table 3
Out of 35 Tube drain patients, 31 (88.6%)showed sterile culture report and 4(11.4%) patients showed bacterial growth.Out of 5 Corrugated patients, 1(20%) patient had sterile culture reportand4(80%) patients showed bacterial growth.Bacterial growth was significantly more seen in patients with Corrugated drain.

Table 3: Distribution between culture finding in drain type

CULTURE FINDING		Sterile	Bacterial Growth	Total
TUBE	No. of patients	31	4	35
	Percentage %	88.6%	11.4%	100%
CORRUGATED	No. of patients	1	4	5
	Percentage %	20%	80%	100%
Total	No. of patients	32	8	40
	Percentage %	100%	100%	100%

USG abdomen in patients showed no evidence of collection in25(83.3%) and evidence of collection in 5(16.7%) patients as shown in Table 4
This shows that there was no significant intra-peritoneal collection in patients without drain. Out of total 40 patients in whom USG study was done for any intra- peritoneal collection.
33 patients showed evidence of intra-peritoneal collection&7 patients showed no evidence of intra-peritoneal collection.

Table 4: Distribution between USG finding and drain/without drain patients

USG FINDING		Collection Absent	Collection Present	Total
WITHOUT DRAIN	Count	8	2	10
	Percentage %	80%	20%	100%
WITH DRAIN	Count	25	5	30
	Percentage %	83.3%	16.7%	100%
Total	Count	33	7	40
	Percentage %	82.5%	17.5%	100%

There was total 30 cases of abdominal drainage in whom USG study was done.Out of 30 patients,28 patients were with Tube Drainage and 2 patientswere with Corrugated Drainage.
Out of 28 Tube drained patients 23(82.1%) showed no evidence of any collection in abdominal cavity, and 5(17.9%) patients showed evidence of collection in abdominal cavity.
Out of 2 Corrugated drained patients, 2 (I00%) patients showedevidence of no collection and no patient showed evidence of collection.

COMPLICATION AND TYPE OF DRAIN

In our study we had 80 patients with abdominal drainage.These 80 patients were grouped in to Tube and Corrugate Drainage.Out of 70 Tube drain patients, No complicationwas seen in 54(77.1%) and complication was seen in 16(22.9%) patients.Out of 10 Corrugated drain patients, no complication was seen in6(60%) patients and 4(40%) patient showed complication.Fever and wound gaping were two complications which occurredin both groups.
Complications occurred more in Corrugated Drainage as compared to Tube Drainage.

Table 5: Complication in drain and without drain patients

Complication		Absent	Present	Total
Without Drain	No. of Patients	16	4	20
	Percentage	80%	20%	100%
With Drain	No. of Patients	60	20	80
	Percentage	75%	25%	100%
Total	No. of Patients	76	24	100
	Percentage	76%	24%	100%

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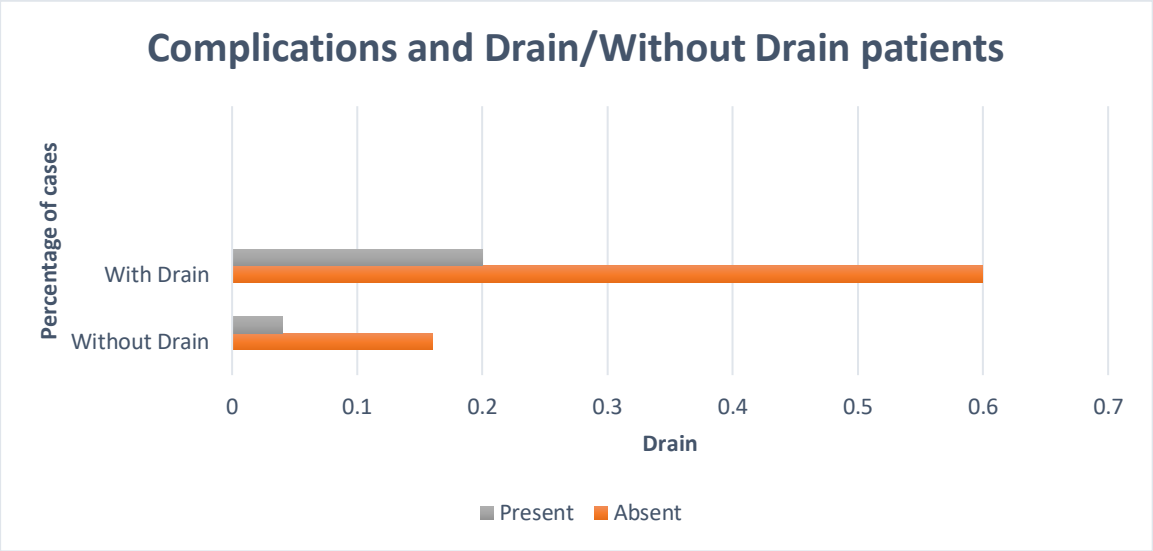
Graph 1: Complications and Drain/Without Drain patients



Out of total 80 Drained patients, Mean Duration of stay in tube,drained patients were 9.39 days. Mean Duration of stay in Corrugated Drain patients was 7.3 days as shown in Table 6

Table 6: Duration of discharge

Discharge (POD)	Type of Drain	Patients	Mean	Standard deviation
	Tube	70	9.39	2.451
	Corrugated	10	7.30	0.949

DISCUSSION

In our study of 100 cases, we categorized them into age groups spanning decades. The majority of patients, constituting 60% of the cases, were found to be in their third, fifth, and sixth decades of life. Among the 100 cases, 76% were male and 24% were females.

Marchegiani et al (2018)[12] conducted a study in which a total of 320 patients undergoing standard pancreatic resection (196 PD and 124 DP), a similar trend is observed. In the pancreatic resection study, 59% of patients had OPD placement, while 41% had CSD placement. While direct comparisons of age distribution and gender ratios between the two studies weren't provided, the predominance of male patients and the higher frequency of OPD placement in both studies suggest potential similarities in patient demographics and surgical practices across different settings.

In our study, 80 patients were assigned with a drain, while 20 patients were not. The mean duration of hospital stay for patients with a drain was 9.13 days, whereas for those without a drain, it was 7.4 days.

Among the 80 patients with a drain, 49 individuals (62.1%) had their drain removed on the 6th or 7th postoperative day. For the remaining cases, drain removal occurred on different days: 11 patients on the 5th day, 4 patients on the 8th day, and 1 patient each on the 9th and 10th days, respectively.

The mean duration for drain removal across various abdominal surgeries was the 6th postoperative day

Young Lim et al (2020)[13] conducted a study involving 388 patients in the drainage group and 111 patients in the non-drainage group found no significant differences in clinicopathological characteristics or operative procedures, except for more frequent D2 lymphadenectomies in the drainage group. Post-surgery, both groups exhibited comparable overall morbidity (drainage group vs. non-drainage group: 24.7% vs. 28.8%, P=0.385) and incidence of major intra-abdominal complications (6.4% vs. 6.3%, P=0.959). The non-drainage group also did not show a significant increase in the incidence rate of major intra-abdominal complications across subgroups divided by age, sex, comorbidity, operative approach, body mass index, extent of lymphadenectomy, and pathological stage. Notably, abdominal drainage did not significantly affect early diagnosis, secondary intervention or reoperation, or recovery from major intra-abdominal complications according to the findings of this study.

In our study, we randomly selected 40 patients with and without abdominal drainage for abdominal ultrasound examination to detect any intra-abdominal collections. Among the 30 patients with abdominal drainage, 25 patients (83%) showed no evidence of collection on ultrasound. Similarly, out of the 10 patients without abdominal drainage, 8 patients (80%) showed no evidence of fluid collection.

Zheng et al (2023)[14] revealed that there was no significant difference in intra-abdominal infection rates, rates of postoperative pancreatic fistula (POPF), rates of clinically relevant POPF (CR-POPF), rates of

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percutaneous drainage, incidence of sepsis, overall morbidity, or time of drain removal between the active drainage (AD) group and the passive drainage (PG) group after abdominal digestive system surgery. Consequently, both active and passive drainage methods were deemed equally effective. Prophylactic drainage has been a common practice following abdominal digestive surgery, aiding in the early detection of postoperative complications such as bleeding and leakage. However, some clinicians have raised concerns that abdominal drains might contribute to pain associated with the drain itself, as well as potentially increase the risk of infection and prolong hospital stays.

CONCLUSION

Upon analysing the data, we observed that peritoneal drainage following various abdominal surgeries did not impact mortality rates. However, it notably elevated morbidity levels.

The insertion of intraperitoneal drains was associated with an increased risk of wound infections, prolonged hospital stays, and required additional time for insertion during surgery and subsequent management postoperatively.

Consequently, it was determined that there is no discernible advantage to routinely placing drains into the peritoneum in all abdominal surgeries. Rather, drain placement should be reserved for specific situations such as gross contamination of the peritoneal cavity, unmanageable ongoing bleeding, or unsatisfactory anastomosis.

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