

# Use of prophylactic pelvic drain after elective anterior resection: (short- and long-term outcome)

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## Abstract

**Background:** Prophylactic drainage after elective Anterior resections with stapled colorectal or colo-anal anastomosis decreases neither the rate of cases with one or more post-operative complications maybe impacted by drainage nor the complications severity.

**Aim and objectives:** This study aimed for comparing cases who experienced routine pelvic drainage with those who didn't regarding the complication rate and severity thereafter elective anterior resection (AR).

**Subjects and methods:** Retrospective cohort study, 54 cases were arbitrarily allocated into the pelvic drainage group and 29 to the no pelvic drainage group. All 83 anastomoses were examined for air-tightness intra-operatively and mended if leak was detected.

**Results:** This study shows that a statistically significant change was found among the study groups as (With drainage and Without drainage) regarding cardiovascular dis, HTN, IHD, drain, open/Lap, covering stoma and mean mortality during hospital stay.

No significant change statistically was found among the study groups as (With drainage and Without drainage) as regard post op leak, localized abscess (infected haematoma), and mortality during hospital stay.

**Conclusion:** Routine pelvic drainage after elective anterior resection does not reduce the rate or severity of anastomotic leak. It may, infrequently, be harmful.

## Introduction

The colonic lumen comprises from 10<sup>8</sup> to 10<sup>10</sup> aerobic and an-aerobic germs /gm of feces. This may clarify why post-operative infectious complication, the occurrence of it ranged between 10 and 70%, can be more in cases underwent operations of the colon than in those underwent any other abdominal operations. Anastomotic leakages are the main reasons of post-operative infectious complications, accountable for 25- 35% of mortalities [1].

The Guidelines for Avoidance of Surgical Site Infections (SSIs), made by the Centers for Diseases Controlling and Preventions (CDC) in 1999, indorses that 'If drainage is essential, utilize a locked suction drains and eliminate the drains once it possible'. New RCTs and metanalyses have maintained the restricted usage of prophylactic intraabdominal drainages for several gastro-intestinal operations [2].

Numerous events were defined to reduce the post-operative complications rate and the severity, particularly infectious side-effects, in addition to the reduction anastomotic leakages. These comprise anti-biotic prophylaxis, anti-septic mechanical preparations, diverting stomas, omental wrapping round the anastomosis, and intra operative air- tightness test resulting in comprehensive anastomotic air-tightness integrities [3].

The majority of surgeons were supporter repetitive usage of drains after pelvic anastomose. Proponentes of this maintain that they permit egress of fluids collection that have the possibility of becoming infected,

permit early recognition of anastomotic dehiscence, and do no harm. Objectors to the use argue that it can impede healing of the anastomoses confer no benefit and may cause harm. A recent RCT of pelvic drainage thereafter rectal resection suggested that a pelvic drain thereafter rectal resections didn't present any advantage to the patients [4].

The prophylactic drainages of the abdomen space were suggested for these same causes in 1950<sup>th</sup>. Prophylactic drainage is supposed to (1) reduce the rate of anastomotic leakages by the evacuation of serositis and blood that, once contaminated, may cause sore formations and hole of the abscess into the inosculation; (2) reduce the complication severity via early diagnosing; and (3) ease the diagnosing of intra-peritoneal hemorrhage [5].

In contrast, surgeons who are opposite to drainage trust that it (1) really excites the formations of serous fluids; (2) may result in infections from exterior; (3) rises the rate of leakages via avoiding the mobilizations of omentum and neighboring organs, obstructing their closing action on the anastomotic sutures or even making leak by mechanically

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erosion of the inosculation; and (4) is enclosed off rapidly [6]. Suction drainages can (1) reduce the quantity of infection coming from exterior by preserving -ve pressure on the tissue, (2) be accompanying with lesser post-operative adherences, (3) be accompanying with lesser anastomotic leakages, and (4) be encapsulated less rapidly. Suction drainages was utilized in 1 of the RCTs, while non-suction drainages were utilized in the other [7].

We, consequently, performed a great, multi-center, prospective, controlled by randomization, to find out (1) whether prophylactic drainages reduced the complication severity and rate ultimately connected to drainages, thereafter colonic resections followed directly by intraabdominal suprapromontory colonic inosculation; and (2) whether one kind of drains (suctions or non-suction) was better than the other.

## Patients and methods

83 cases with ages mean of 67 years (22-95) enrolled in this work from (December 2020 to December 2021). Data collections of all cases was completed but all the cases weren't enrolled in the research at similar time.

**Sample size:** As mean length of hospital stays due to complications in drainage group 24.5+/-1.89 compared to 26.1+/-2.87 in non-drainage group [2]. So, sample size is 74. Sample was increased 10% to avoid follow up bias and to be 83. Sample has been estimated via Open Epi program with 95 % confidence and 80% power methods.

**Colonic Preparations:** All cases experienced colonic mechanically preparations, counting the administrations of laxatives (sennosides) or poly-ethylene glycol, that comprised the administrations of enemas which were applied at 6 PM and in the morning (3 h) preoperatively. All cases have a 1-dosage mixture of systemic ceftriaxone sodium and metronidazole at anesthesia inductions.

**Resections and Anastomosis:** Mechanical bowel preparations has been performed in all cases the day pre-operation. Colorectal inosculation stapled by means of linear stapling device. All colorectal inosculates were performed by means of a circular stapling instrument and were intra-operatively examined by trans-anal air insufflations. The intestine was unfocussed by a defensive loop ileostomy in 38 cases of 53 cases who had pelvic drains and 12 cases out of 30 in no drainage group for rectal resection with whole mesorectal excisions and coloanal inosculation in cases with lower rectal tumor.

**Testing for Airtightness:** The contributing physicians were requested to examine for airtightness by observing bubbles appearance when the colon barrier was swollen with air inserted into the colonic lumens, and digits located on two sides of colorectal or colo-anal anastomoses, or by a balloon-overstated Foley catheter introduced via the anus for distal colorectal inosculates clamped proximally. If anastomotic leak was observed, additional sutures were added till comprehensive airtightness was attained.

**Random Allotment:** After the resections and inosculation were accomplished and confirmed for airtightness, cases experienced drainages (D+) or not (D-), as shown below the creased upper right corner of questionnaires rather than the envelopes technique. Cases have been located in D+. Arbitrary allocation was stable via blocks of four in every center. This work was accepted by the ethics committee of the coordination center.

**Drainage:** A locked drainage system of silastic has been utilized in all patients, no suction has been used. The diameter of drainage was 24 Ch.

**End Points:** The initially end point was the percent of cases with 1 or more post-operative complications ultimately connected to drainages, counting (1) Deep complication that maybe impacted by drainages and for which drainages can cause earlier diagnosing, counting anastomotic leakages, general or local peritonitis, intraabdominal haemorrhage, or haematoma. Anastomotic leakages were detected via the egress of fecal fluids via drain, by a following procedure or an autopsy (accomplished regularly for all cases who passed away in hospital). The post-operative interval comprised the total hospitalization, regardless of its period, and the 30-day after discharging. All cases were seen on that date as wounds surface (infections) or deep (hematomas, sores, and fistulae) side-effects are recognized to happen after discharging.

## Statistical analysis of the data

Statistical analysis was performed via SPSS version20. Data had been examined for normal distribution by means of the Shapiro Walk testing. Qualitative data have been introduced as frequencies and relative percentages.  $\chi^2$  test was utilized to determine change among qualitative variables as specified. Quantitative have been introduced as mean and SD. Student t testing has been utilized to determine variance among quantitative variables in 2 groups. Results considered significant at P-value < 0.05.

## Results

This study shows that a statistically significant change was found among the study groups as (With drainage and Without drainage) regarding cardiovascular dis, HTN, IHD, drain, open/Lap, covering stoma and mean mortality during hospital stay.

A statistically nonsignificant change was found among the study groups as (With drainage and Without drainage) regarding post op leak, localized, abscess, generalised and mortality during hospital stay.

The current work showed that 3 out of 83 cases (2 with drains and one without the drain) had a post anastomotic leak with significant difference in age, cardiovascular comorbidities and no defunctioning stoma was done on the same set with elective anterior resection [8,9].

## Discussion

Prophylactic drainage after elective Anterior resections with stapled colorectal or colo-anal anastomosis decreases neither the rate of cases with one or more post-operative complications maybe impacted by drainage nor the complications severity.

This table (Table 1 and Table 2) shows that a statistically no significant change was found among the study groups as (With drainage and Without drainage) and for tumor site either Rectosigmoid or Rectal. No significant change was found among the study groups as regard Neoadjuvant chemorad, Age, Gender, smoking, DM, Steroids and ASA grade.

A statistically nonsignificant change was found among the study groups as open/lap (With drainage and without drainage) post op leak, localized abscess, generalized peritonitis and mortality during hospital stay.

Merad et al. [10] showed that the two studied groups were similar regarding pre-operative data, excluding that there were significantly ( $P$  value<0.02) more cases with ascites in cases who didn't experience drainages. In accordance with our findings, other parameters, counting weight losing ( $P$  value<0.20), corticosteroids usage ( $P$  value<.10), Crohn disorder ( $P$  value<0.30), intra-operative fecal soiling ( $P$ <0.10),

**Table 1:** Comparing among the study groups as regard demographics.

	With drainage (n = 54)	Without drainage (n = 29)	Test of Sig.	P
Rectosigmoid	4 (7.4%)	4 (13.8%)	$\chi^2=0.883$	$^{FE}p=0.441$
Rectal	39 (72.2%)	19 (65.5%)	$\chi^2=0.403$	0.526
Neoadjuvant chemorad	3 (5.6%)	2 (6.9%)	$\chi^2=0.060$	$^{FE}p=1.000$
Age Mean $\pm$ SD, Median (Min. – Max.)	66.30 $\pm$ 9.36 66.30 $\pm$ 9.36	67.03 $\pm$ 12.53 71.0 (28.0 - 84.0)	t=0.304	0.762
Gender Male Female	40 (74.1%) 14 (25.9%)	17 (58.6%) 12 (41.4%)	$\chi^2=2.094$	0.148
Smoker No Smoker EX	35 (64.8%) 4 (7.4%) 15 (27.8%)	26 (89.7%) 1 (3.4%) 2 (6.9%)	$\chi^2=6.058$	$^{MC}p=0.044$
DM	13 (24.1%)	5 (17.2%)	$\chi^2=0.519$	0.471
Steroids	2 (3.7%)	0 (0.0%)	0 (0.0%)	$^{FE}p=0.540$
ASA 1 2 3	7 (13.0%) 38 (70.4%) 9 (16.7%)	5 (17.2%) 18 (62.1%)	$\chi^2=0.601$	0.741

SD: Standard deviation, t: Student t-test,  $\chi^2$ : Chi square testing, MC: Monte Carlo, FE: Fisher Exact, \*: Statistical significance at p

and leakages on testing for airtightness (*P value*<0.50), were met more commonly in who didn't experience drainages, but these variances were nonsignificant (Figure 1 and Figure 2).

In agreement with our results, Hirahara et al. [2] found nonsignificant changes in terms of the mean age of the cases, males/females' ratio, BMI, and concurrent disorders among the study groups.

In a systematic review by Podda et al. [11], several series stated a diversity of risk- factors for AL post colo-rectal operation, counting age, pre-operative nutritious condition, cardio-vascular and respirational co-morbidities, incidence of opposing intra- operative effects, and the existence of a de-functioning stoma. Tumor localizations in the lower and middle third of the rectum, predominantly with an anastomotic height of <50 mm from the anal border, have as well been measured clinical risk-factors for AL This study shows that a statistically significant change was found among the study groups as (With drainage and Without drainage) regarding cardiovascular dis, HTN, IHD, drain, open/Lap, covering stoma and mean mortality during hospital stay. A statistically nonsignificant change was found among the study groups as (With drainage and Without drainage) and AF, AO, AVR, Dil cardiomyopathy, HF, MVR, post op leak, localized, abscess, generalised and mortality during hospital stay.

In disagreement with our results, Hirahara et al. [2] revealed that there was insignificant difference between both groups as regard cardiovascular diseases, Hypertension, Ischemic heart disease.

Post-operative outcomes are summarized in a study by Hirahara et al. [2]. Total post- operative problems built on the Clavien-Dindo classifications were found in 31% and 30% of cases in the drain and no drain groups, resp., and a nonsignificant change was found in complication rates among the study groups. There was no in-hospital death in this work, but single case in the no-drain group who advanced Petersen's hernia needed re-operation on 8<sup>th</sup> day post-operatively. As regard the post-operative hospitalization, a nonsignificant change was detected among both groups. When taking the existence and non-presence of post-operative problems into attention, the hospitalization period didn't vary among both groups.

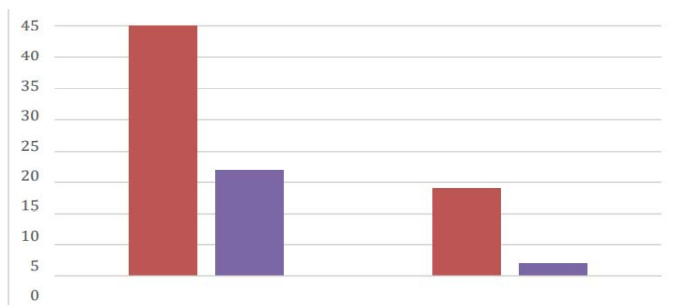
In disagreement to preceding suggestion, the metanalysis by Rondelli et al., [12] which enrolled randomized and nonrandomized reports, revealed that the existence of a prophylactic drains decreased the occurrence of extra-peritoneal colorectal AL and the rate of re-operations thereafter anterior rectal resection. But the protecting value of PD was maintained by the data from nonrandomized reports only, as the sub-group investigation of RCTs didn't display any advantage for PD usage.

Moreover, the big Dutch study by Peeters et al., [13] revealed that, on multi- regression analysis, the non-presence of a pelvic drainages and a de-functioning stoma were the issues accompanying with anastomotic

**Table 2:** Comparing among the study groups as regard different parameters.

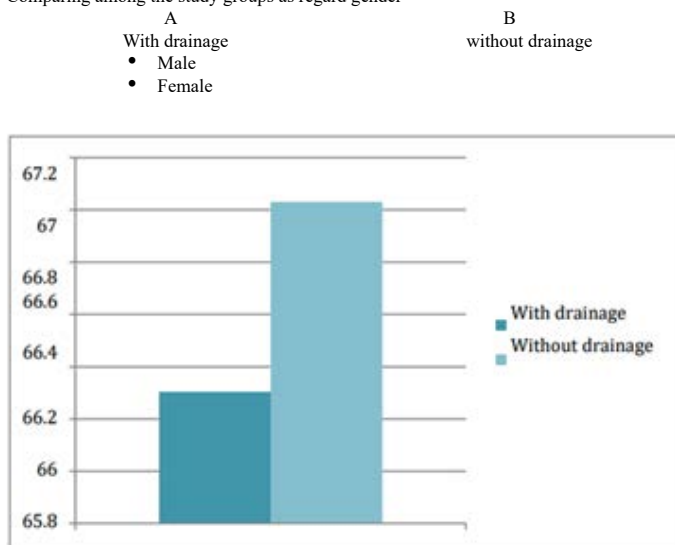
	With drainage (n = 54)	Without drainage (n = 29)	Test of Sig.	P
Cardiovascular dis	2 (3.7%)	11 (37.9%)	$\chi^2=16.733^*$	$^{FE}p<0.001$
AF	0 (0.0%)	1 (3.4%)	$\chi^2=1.885$	$^{FE}p=0.349$
AO	0 (0.0%)	1 (3.4%)	$\chi^2=1.885$	$^{FE}p=0.349$
AVR	0 (0.0%)	1 (3.4%)	$\chi^2=1.885$	$^{FE}p=0.349$
Dil cardiomyopathy	0 (0.0%)	1 (3.4%)	$\chi^2=1.885$	$^{FE}p=0.349$
HF	0 (0.0%)	1 (3.4%)	$\chi^2=1.885$	$^{FE}p=0.349$
HTN	2 (3.7%)	6 (20.7%)	$\chi^2=6.250$	$^{FE}p=0.019^*$
IHD	0 (0.0%)	3 (10.3%)	$\chi^2=5.796^*$	$^{FE}p=0.040^*$
MVR	0 (0.0%)	1 (3.4%)	$\chi^2=1.885$	$^{FE}p=0.349$
Drain	54 (100.0%)	0 (0.0%)	$\chi^2=83.00$	$^{FE}p<0.001$
Open/Lap OPEN LAP	37 (68.5%) 17 (31.5%)	7 (24.1%) 22 (75.9%)	$\chi^2=14.919$	$^{FE}p<0.001$
Covering stoma	42 (77.8%)	13 (44.8%)	$\chi^2= 9.164$	$^{FE}p= 0.002$
Post op leak	3 (5.6%)	1 (3.4%)	$\chi^2=0.183$	$^{FE}p=1.000$
Localized	3 (5.6%)	0 (0.0%)	$\chi^2=1.672$	$^{FE}p=0.548$
Abscess	3 (5.6%)	0 (0.0%)	$\chi^2=1.672$	$^{FE}p=0.548$
Generalised	3 (5.6%)	0 (0.0%)	$\chi^2=1.672$	$^{FE}p=0.548$
Mortality during hospital Stay	2 (3.7%)	0 (0.0%)	$X^2=1.101$	$^{FE}p=0.540$
Mean $\pm$ SD.	10.25 $\pm$ 5.06	7.28 $\pm$ 2.90		
Median (Min. – Max.)	9.0 (5.0 - 30.0)	6.0 (3.0 - 14.0)	$X^2=418.50^*$	$^{FE}p=0.001$

SD: Standard deviation; U: Mann Whitney test;  $\chi^2$ : Chi square testing; FE: Fisher Exact \*: Statistical significance at p < 0.05



**Figure 1:** Comparing among the study groups (With drainage and Without drainage) according to gender.

Comparing among the study groups as regard gender



**Figure 2:** Comparing among the study groups (With drainage and Without drainage) according to age.

dehiscence. More definitely, the existence of one or more pelvic drains postoperatively was significantly accompanied with a lower AL: 9.59% of cases with pelvic drainages had leakages, in comparison with 23.50% of cases with no drain, and 8.20% of cases with a de-functioning colostomy or ileostomy had a leakage, in comparison to 16% with not a stoma. Consequently, the authors reported that, in a try to minimize the risks of clinical AL, the constructions of a de-functioning stoma and the assignment of one or more drainages in the presacral cavity looks desirable for cases with proximal as well as distal rectal tumors.

Merad et al. [10] showed that the post-operative death in their study was 4.4%, which was within the rates of post-operative mortality reported in the other studies:

3- 6% in a trial by Hoffmann et al. [14] and in a study by Sagar et al. [15] Merad et al. [10] showed that 0.30% rate of mortality because of anastomotic leakages was less than the rates of 0.85- 2.00% stated somewhere else in a study by Hagmüller et al. [16] and a study by Sagar et al., [15]. In contrast, there were no mortalities secondary to anastomotic leakages in 2 of the other trials by Johnson et al. [17] and Sagar et al. [15].

## Conclusion

Routine pelvic drainage after elective anterior resection does not reduce the rate or severity of anastomotic leak. It may, infrequently, be harmful.

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