

Original Research Article

Is using peritoneal drains in bowel surgeries beneficial?

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ABSTRACT

Background: Surgical drains of various types have been used, with the best intentions, in different surgeries for many years. It is often open question whether they achieve their intended purpose despite many years of surgery. There is paucity of evidence for the benefit of many types of surgical drainage and many surgeons still 'follow their usual practice'. The dictum 'when in doubt, drain' from Lawson Tait, is well known to surgeons'. But many studies we find routine placement of drain has been shown to be ineffective or potentially harmful in various abdominal surgical procedure. We thus performed a systematic review of the studies of outcomes of with or without peritoneal drain in abdominal surgeries.

Methods: A comparable study was conducted in between two groups with and without drain in patient belonging to all age undergoing small and large bowel surgeries. A random patient selection was done. Pooled estimates of mortality, morbidity, wound infection, blockage, pain, anastomotic leak, re-intervention and length of hospital stay were calculated.

Results: With drain; duration of stay is more than without drain with p value found to be 0.0087. Drain is ineffective due to blockage in 38% patient. Wound infection is more with drain with p (0.003). Pain is more with drain with p (0.0001). There is no difference in anastomotic leak, distension, re-intervention and mortality with or without drain.

Conclusions: After a century of scientific investigation and research, all surgeons should recall the words of Halstead 'no drainage at all is better than ignorant employment of it' rather than the advice of Lawson Tait 'when in doubt, drain.

Keywords: Ascending infection, blockage of drain, Peritoneal drain, Small and large bowel surgery, Pain due to drain

INTRODUCTION

Surgical drains of various types have been used in a variety of surgeries in the past.¹ Despite their use for so many years, it is often questioned whether they achieve their intended purpose. There is inadequate evidence for the benefit of many types of surgical drainage and yet, many surgeons still 'follow their usual practice'. With better evidence, management of surgical patients should improve and surgeons should be able to practice based

upon scientific principles rather than simply 'doing what I always do'.²

Despite the lack of definitive evidence, many of the controversies with regard to the use of drains have not been resolved successfully. There still exists a major controversy regarding prophylactic drainage following routine abdominal surgery. The dictum 'when in doubt, drain', from Lawson Tait, is well known to most surgeons.^{3,4} However, as complications can occur with the use of drains, the words of Halstead in 1898 might be

more appropriate - 'no drainage at all is better than the ignorant employment of it'.

Surgical drains are used in a variety of different types of surgery. Generally speaking, their purpose is to decompress or drain either fluid or air from the area of surgery. For example,

- To prevent the accumulation of fluid (blood, pus and infected fluids)
- To prevent accumulation of dead space (air)
- To characterise fluid (early identification of anastomotic leak).⁵

A surgical drain is a tube used to remove pus, blood or other fluids from a wound. As often believed, drains inserted after surgery do not result in faster wound healing or prevent infection but are sometimes necessary to drain body fluid which may accumulate and in itself become a focus of infection. With the use of better surgical techniques, the routine use of drains for surgical procedures is diminishing. It is felt now that drains may hinder actually the recovery by acting as an 'anchor' limiting mobility post-surgery and the drain itself may be a cause of infection into the wound. Having said this, in certain situations, their use is unavoidable. Drains have a tendency to become occluded or clogged, resulting in retained fluid that can contribute to infection or other complications. Thus, once put to use, efforts must be made to maintain and assess patency. Once a drain becomes clogged or occluded, it should be usually removed as it is no longer provides the intended benefit. Abdominal drain lead to protein reach reactionary fluid from body which leads to protein loss which leads to delay in wound healing.

Historically, the various arguments that have been made for their use include:

- Drainage of fluid removes the potential sources of infection
- Drains guard against further fluid collections
- May allow the early detection of anastomotic leaks or haemorrhage.

Likewise, the arguments against their use include:

- Presence of a drain increases the risk of infection
- Damage may be caused by mechanical pressure or suction
- Drains may induce an anastomotic leak
- Most drains become ineffective after 24 hours.

METHODS

Selection of cases

Patients admitted in the surgical ward who underwent some form of bowel surgery were taken in the study.

Sample size: 100

Method of data collection

A detailed clinical history was taken regarding the symptoms which included abdominal pain, abdominal distension, vomiting, altered bowel habits, and fever. Details regarding past history and personal history were taken.

Inclusion criteria

Patients belonging to all age groups undergoing small and large bowel surgeries including malignancies were included in the study.

Exclusion criteria

- Patients undergoing hepatobiliary and pancreatic surgeries
- Patients undergoing gastric surgeries
- Patients undergoing urological surgeries.

In this study, patients undergoing bowel surgeries were randomly assigned into two groups: with drains and without drains.

RESULTS

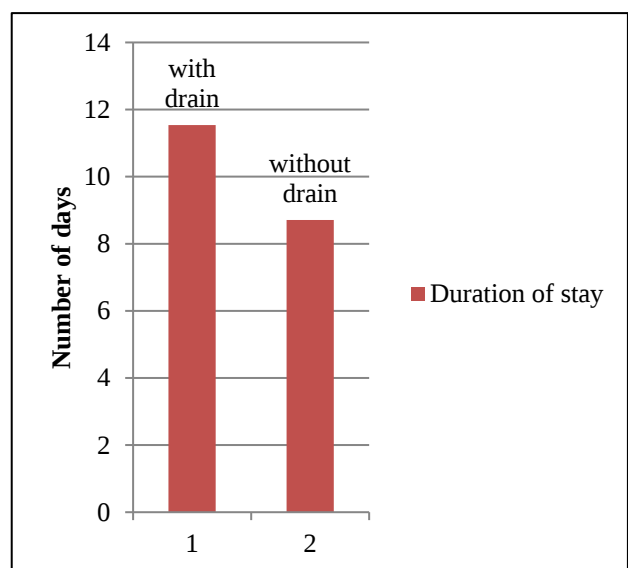


Figure 1: Duration of stay.

Duration of stay in patients in whom drains were kept was 11.54 while that in those patients in whom drains was not kept was 8.71.

In this study, 22 out of 48 patients with drains developed wound infection, while only 10 out of 52 patients without drains developed wound infection ($p = 0.003$). Thus, there was a significant statistical difference in the rates of

wound infections in the two groups. This represent that with drain their much more chance of wound infection.

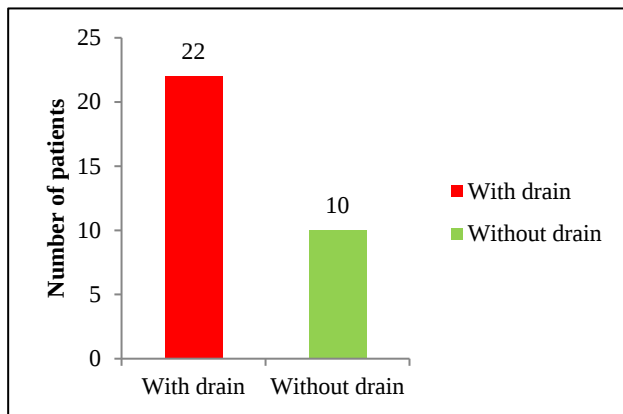


Figure 2: Wound infection.

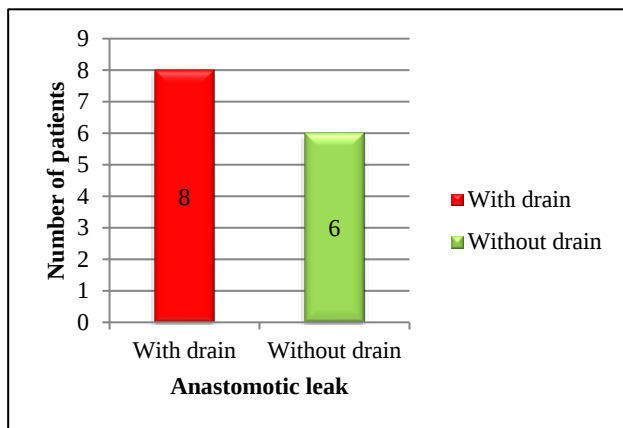


Figure 3: Anastomotic leak.

Showing anastomotic leak in drained and non-drained groups

It was found that, 8 out of 48 patients with drains, while 6 out of 52 patients without drains developed an anastomotic leak.

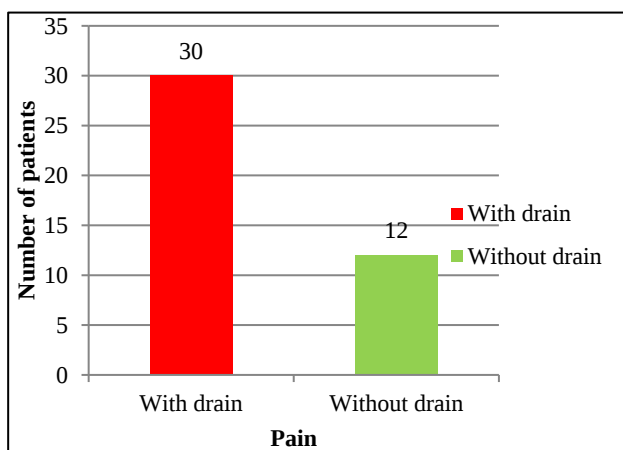


Figure 4: Pain.

It was found that 30 out of 48 patients with drains complained of pain at the drain site, while only 12 out of 52 patients had complaints of pain, more so at the incision site. This was found to be statistically significant.

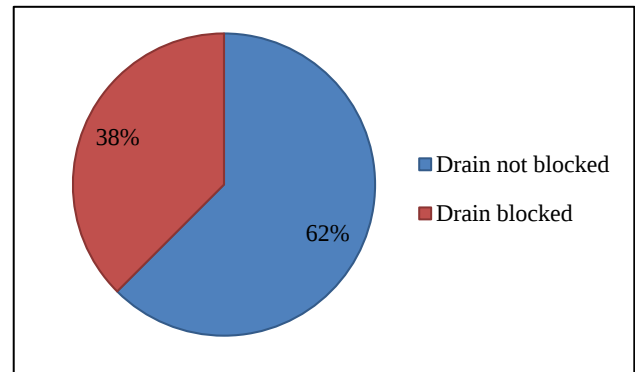


Figure 5: Drain blockage.

It was found that in about 38% of patients; the drain was blocked thus rendering it ineffective, while it was functional in only about 62% of patients.

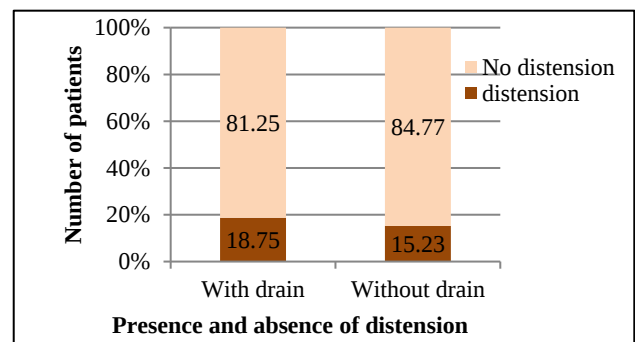


Figure 6: Distension.

It was found that 8 out of 48 patients in the drain group and 9 out of 52 patients in the without drain group developed post-operative period.

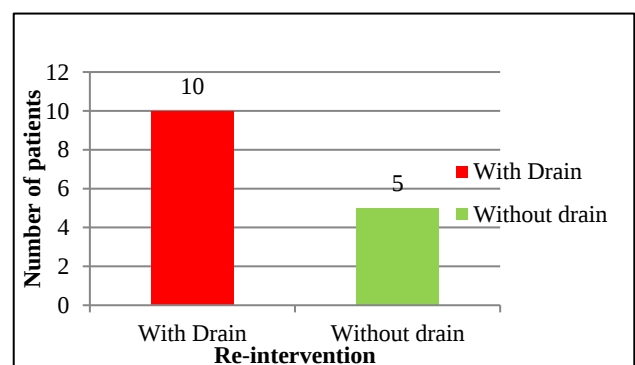


Figure 7: Re-intervention.

It was found those 10 out of 48 patients with drains and 5 out of 52 patients in the non-drained group required re-intervention of some form.

Table 1: Mortality.

Mortality	
With drain	7
Without drain	5

It was found that 7 patients with drains died, while 5 patients without drains died.

Table 2: Change of organism.

With drain				
Primary Swab	No of patients	Secondary swab	No of patients	%
Negative	19	Positive	10	52.63
Positive	26	changed	11	42.31

52.63% of patients with drain, when the primary swab was negative, the secondary swab was found to be positive.

In 42.31% of patients with drains, where the primary swab was positive for a particular organism, it was found that there was a change in the organism cultured on the secondary swab.

In 5.06% of patients with drains, there was found to be no difference in the results of the primary and secondary swabs.

DISCUSSION

The philosophy that 'drainage of the body cavities saves many lives' is being practised without any randomised trial. It has been claimed that drainage of an operation site would overcome the complications that would have occurred otherwise in the postoperative period.⁶

During the last three decades, surgeons have made an effort to investigate the role of prophylactic drainage after abdominal surgeries in controlled randomized clinical studies. Despite evidence based questioning the prophylactic drainage after abdominal surgeries in many instances, surgeons still continue to use abdominal drains in a routine basis all over the world.

Furthermore, drains have been implicated in the causation of local pain, causing interference with patient ambulation, as demonstrated by patients with colonic and rectal surgeries.^{7,8} Drains are also associated with the risk of ascending infection via the drain.^{9,10}

In this study, a total of 100 patients were studied, in 48 of which an abdominal drain was kept following a bowel surgery and in 52 of them, no drain was kept. All patients were closely monitored in the postoperative period. The various parameter by which patient outcome was monitored were duration of hospital stay, postoperative pain, wound infection, anastomotic leak, postoperative

abdominal distension, need for re-intervention and mortality.

All the patients included in this study underwent some form of laparotomy for small or large bowel pathology. Swabs were sent in the intra operative and the postoperative period and these results were compared. In the postoperative period, they were closely monitored.

Duration of stay

In this study, it was found that the average duration of stay in patients with drains were kept for 11.54 while without drains was kept for 8.71.

This difference in length of hospital stay is probably attributed to the fact that patients are mobilized faster in the absence of drains.^{7,8}

In a randomized control trial conducted to study the use of prophylactic peritoneal drains in cases of perforated appendicitis, it was found that patients with drains inserted stayed for an average of 6 days as compared to those without drains.¹¹

Drain blockage

In this study, it was found that in about 38% of patients; the drain was blocked thus rendering it ineffective, while it was functional in only about 62% of patients.

The common cause of drain blockage was found to be the accumulation of debris or blood clots at the lumen of the abdominal drain which is not visible on external inspection.

Wound infection

In this study, 22 out of 48 patients with drains developed wound infection, while only 10 out of 52 patients without drains developed wound infection ($p = 0.003$). Thus, there was a significant statistical difference in the rates of wound infections in the two groups.

In a study conducted to assess the advantages of prophylactic drainage in various gastro-intestinal surgeries in 2004 by Petrowsky et al, it was found that the patients in the non-drained group had a slight advantage with respect to wound infections.¹²

In another study conducted in 1998 to study the effect of prophylactic drainage in colonic resections, it was found that there was no statistical difference in the postoperative complications following these surgeries in the drained and without drained groups.¹³

Similar findings of increased wound infection rates have been found in studies conducted to assess the usefulness of prophylactic drainage in patients of appendectomy.¹¹

In a meta-analysis conducted in 2011 studying the routine use of drains in colo rectal surgeries which concluded the rates of wound infection were identical in the drained and without drained groups. Thus, they concluded that routine use of drains offered no significant benefit.¹⁴

Pain

In this study, it was found that 30 out of 48 patients with drains complained of pain at the drain site, while only 12 out of 52 patients had complaints of pain, more so at the incision site. This was found to be statistically significant.

Pain occurring at the drain site is a well-known complication following the placement of drains in abdominal surgeries.

In studies conducted in the past, there was no statistical difference in the incidence of post-operative pain at the drain site.¹²

Anastomotic leak

In this study, 8 out of 48 patients with drains, while 6 out of 52 patients without drains developed an anastomotic leak. This was not found to be statistically significant.

In this study, it was observed that in patients without drains who developed a leak, the contents of the leak were found to come out through the suture line. It was also observed that patients in who drains were kept, out of the 8 patients that leaked; the drain was effective only in 3 out of 8 patients. In 1 patient, the leak contents came through the peri-drain site, not actually draining from the drain while in the remaining 4 patients, it was seen that the contents came through the suture site. Thus, it was observed that the drain was not always effective in detecting the leak.

In a meta-analysis by Urbach et al evaluating the use of prophylactic drains in various gastro-intestinal surgeries, it was found that in only 1 out of 20 patients, clinical pus or faeces leaked through the drain, thus showing that the sensitivity of drains in detecting a leak is quite low.¹⁵

In the Cochrane study conducted by Petrowsky et al, it was found that 2% patients with drains and 1% patients without drains showed a leak. This was of no statistical difference.¹² In another meta-analysis conducted debating the use of drains in colorectal surgeries in 2011, it was found that the Odd's ratio for drained versus non-drained group was 1.4, showing no statistical difference in the leak rates in the two groups.¹⁴

Distension

In this study, it was found that 8 out of 48 patients in the drained group and 9 out of 52 patients in the non-drained group developed post-operative period. The p value was >0.01 , thus, showing that there was no statistical

difference in the two groups. In most cases, the distension was due to postoperative ileus which got corrected without requiring any intervention.

Re- intervention

In this study, it was found those 10 out of 48 patients with drains and 5 out of 52 patients in the non-drained group required re-intervention of some form. The p value was 0.12 i.e. >0.01 which was not statistically significant.

In the study conducted by Petrowsky et al at the Cochrane database, assessing the benefits of prophylactic drainage in colorectal surgeries, it was found that 6% patients in the drained group and 5% patients in the non-drained group required re intervention in some form.¹² In this study, re-intervention was required in the form of either re-suturing for wound gape or re intervention for anastomotic dehiscence or burst abdomen.

Mortality

In this study, 7 out of 48 patients in the drained group and 5 out of 52 patients in the non-drained group died. The p value calculated was 0.54 i.e. >0.01 and thus was not of statistical significance. In a study conducted by Fethi et al to study the prophylactic drainage in elective colonic resection and supra laparotomy anastomoses, the mortality rates were 4% in each group and thus comparable.¹³

In this study, the mortality was not found to be significantly associated with the anastomotic leak. 8 patients died out of extra abdominal complications such as respiratory failure and renal failure. 1 patient died because of advanced malignancy. Deaths of 3 patients were found to be due to an anastomotic leak.

Ascending infection via drains

In the study we conducted, we observed that in 19 out of 48 patients with drains, the primary swab was negative. Out of these, in 10 patients, the secondary swab was found to be positive. This signified that the drain probably acted as a foreign body stimulating secretion of fluid which got contaminated bacteriologically.

Also, out of 48 patients in the drained group, 26 were positive for an organism in the primary swab, the most common organism found to be E coli. Of these, in 11 of them a different organism was cultured in secondary swab. The common organisms cultured were found to be Staphylococcus and Klebsiella. This signified that the tube drains probably are a causative factor for the retrograde infection via these drains. In another study conducted, to study the use of drains in perforated duodenal ulcers, findings suggestive of ascending infections via the drain.¹⁶ The probable reason for such retrograde infection in the group of patients with drains is that there is bacterial migration along both the outer and

inner surfaces of the draining tubes causing retrograde infection. Drain material provides a surface for the bacteria to adhere to and bypass the body's usual defences such as skin, tissue macrophages, mucosal IgA, etc.

CONCLUSION

Routine use of drains has been an age old practice without any substantial evidence supporting the same. In our study conducted from 2011 to 2013, we have come to the following conclusions regarding the use of abdominal drains in small and large bowel surgeries.

- Use of abdominal drains was associated with a number of complications. Study found that the incidence of pain was more in patients belong to the drained group
- The incidence of wound infection and wound gape was found to be more in the patients belong to the drained group
- In this study, we found that the duration of hospital stay of patients, in whom study kept drains was more than for patients in whom we did not keep drains
- It was found that use of abdominal drains was associated with ascending infections via the drain
- The common organisms that were cultured from the drain fluid and the tips of the peritoneal drains were *Staphylococcus aureus*, *Klebsiella* spp, and *Proteus* spp. in our study
- Study also found in a significant number of patients, the abdominal drains were blocked with either debris or a blood clot.
- Certain other post-operative complications such as distension and the need for re intervention did not differ in the drained and non-drained groups.
- Regarding anastomotic leak, it was found that the incidence was similar in the drained and non-drained groups.
- Study also found that drains were not always able to detect the anastomotic leak.

Thus, in this study, we found that the routine use of abdominal drains after small and large bowel surgeries did not offer any significant benefit to the patients. In fact, we found that certain complications were more common in those patients in whom we kept drains, thereby leading to increased length of hospital stay. Thus, to summaries our study, abdominal drains were of little benefit following intestinal surgeries and in all probability, they added to the morbidity of the patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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