ECRONICON OPEN ACCESS

EC CLINICAL AND EXPERIMENTAL ANATOMY

Research Article

The Sojourn Drain Effects on Tissue Healing in Postoperative Patients

Rahul Anil Sethi[1]*, GF Avetisyan[2], Sanobar Shariff[3] and Burhan Kantawala[3]

[1]Consultant Physician on Panel, Embassy of India in Armenia, Head of Department, International Students' Affairs, Assistant Teaching, Operative Surgery and Topographical Anatomy Department, Visiting Faculty, Faculty of Public Health, Yerevan Sate Medical University, Yerevan, Armenia

[2]Dean, International Students, Associate Professor, Operative Surgery and Topographical Anatomy Department, Yerevan Sate Medical University, Yerevan, Armenia

[3]4th General Medicine Faculty Student, Yerevan Sate Medical University, Yerevan, Armenia

***Corresponding Author:** Rahul Anil Sethi, Consultant Physician on Panel, Embassy of India in Armenia, Head of Department, International Students' Affairs, Assistant Teaching, Operative Surgery and Topographical Anatomy Department, Visiting Faculty, Faculty of Public Health, Yerevan Sate Medical University, Yerevan, Armenia.

Received: February 24, 2021; **Published:** February 26, 2021

Abstract

Introduction: Implants allowing removal of fluid and/or gas from a wound or body cavity are called Surgical Drains. These surgical drains are commonly used generally in thoracic or abdominal surgery to minimize the post-operative complications like infection and hematoma. These are of various types but in our research here we have focused on passive drains made of latex, polypropylene or silastic rubber. The aim of this study was to determine the incidence of post-operative complications and its effect on tissue healing while draining in situ.

Background: The use of surgical drains is common in all types of surgeries and seldom we take efforts to know the origin and their positive or negative effects of these critical devices. The first ever recorded historical evidence for surgical drains were found in the era of Hippocrates (circa 460-377 BC). The Greek Physician Hippocrates used hollow tubes for the treatment of empyema. Negative suction drains are considered the standard of practice in head and neck surgery. Claudius Galen in 200 B.C., whose teachings were held infallible for the next 1500 years, described tubes for the management of ascites. The routine use of drains for surgical procedures is diminishing as better radiological investigation and confidence in surgical technique have reduced their necessity. It is felt now that drains may hinder recovery by acting as an 'anchor' limiting mobility post-surgery and the drain itself may allow infection into the wound. But in certain situations their use is unavoidable. Hence, this study was important to understand their positive and negative effects in real practice.

Patients and Methods: The medical records of 33 adult patients {aged > 18 and < 89} of the surgical department at various hospitals across Yerevan, who had been operated on an acute abdominal process, Armenia were reviewed. We identified 100% of patients taken as a part of this study who had a post-operative drain. Patient demographics, comorbidities, pre- and post-operative complication rates were collected for each patient. The primary outcome focused in this study was the rate of post-operative complications involved with drains especially the tissue healing was mainly focused.

A complication associated with the postoperative period was defined as any event required medical or surgical intervention within 30 days of undergoing initial surgery and that was denoted as the end point of this study. Operating time was denoted from the time or the first incision until the last suture was put. The number of days the drain stayed in the body was denoted by the time the drain was inserted at the end or during the surgical procedure until the time it was completely removed at the post-operative period.

Results: 2 out of 33 patients developed a complication associated with the drainage tube. The rest of the 31 patients as a part of the study did not develop any issues with the tissue healing in the post-operative period and were all healthy recoveries. Statistically speaking, this leaves us with a percentage of 6.06% complication rate associated with these drains used.

Conclusion: Our study suggests that the use of postoperative drains in patients who underwent acute abdominal surgery with either the open approach or laparoscopic approach does lead to a no serious postoperative complication with complication-free rate of 93.94%. Its further aids in the tissue healing by giving an idea the type of process going on in the body post-surgically.

Keywords: *Sojourn Drain Effects; Tissue Healing; Postoperative Patients*

Introduction

Prophylactic placement of drains after thoracic or abdominal surgeries has been a standard practice followed since the 1700's despite any solid evidence or prospective study results to support the practice. Improvement and advancements in surgical tactics, pre-operative and post- operative patient care has significantly reduced the complication rate and mortality rate in acute abdominal surgeries [1]. For several years drains have been used in surgery to remove body fluids thereby improving wound healing and preventing serous fluid accumulation. Drains can be categorized as: 1. Closed or open systems and 2. Active or Passive depending on their function. Negative suction is applied by closed vacuum drains in a sealed environment, producing apposition of tissues and thus promoting healing [2].

A surgical drain is a tube used to remove pus, blood or other fluids from a wound. They are commonly placed by surgeons or interventional radiologists.

There are various indications of drains which can be classified as prophylactic and therapeutic [2].

Prophylactic

1) To remove excess blood and serum.

2) To remove pus, blood, serous exudates, chyle or bile.

3) To form a controlled fistula e.g. after common bile duct exploration.

Therapeutic

1) To drain pus, blood, serous exudates, chyle or bile

2) To drain air from the pleural cavity

3) To drain ascites.

Drains have been proved to be useful in many surgical procedures and now all surgical teams always tend to add postoperative drains after a procedure as it is critical to measure the extent of surgical wound healing [3-6].

Academically speaking drains are not without complications. They can cause haemorrhage, tissue inflammation, retrograde bacterial migration and drain entrapment [2,7]. Various published studies and articles have a mixed opinion on drainage from the abdominal cavity. During the course of this study we came across various articles who do not recommend the use of drainage tubes at the postoperative period and go on to prove that they cause even higher rate of complications [1,8-10]. Similarly, another study also proves that overall mortality in the patients with intraperitoneal drainage was almost three times greater than in the group without drainage. When an anastomotic leak developed, there was no mortality in the patients with extraperitoneal drainage, 11 per cent mortality in those without drainage and a 60 percent mortality in those with intraperitoneal drainage [11-13]. Some studies also focus on the monetary aspect stating that use of drains may prolong the hospital stay and therefore result in inflated and increased treatment costs burdening the patient economically [2,14-17].

According to Dougherty and Steven H. drain complications can be classified into the following groups:

1) Foreign body effects: Chemical and/or mechanical effects, Erosion (haemorrhage, fistula, perforation, obstruction, Torsion bowel obstruction), Potentiation of infection, Tissue irritation, Bacterial surface adherence, Retrograde bacterial migration, Impaired healing of intestinal suture lines.

2) Mechanical problems: Drain entrapment (due to sutures, kinking), Herniation of viscera through drain tracts, Drain loss (due to migration, breakage, fragmentation), Leakage due to incomplete drain tract formation.

3) Physiologic derangements: Decompression injury (lung, brain), Pain (e.g., may lead to pulmonary atelectasis), Fluid and electrolyte loss, Pneumoperitoneum, pneumothorax [18-20]. We have researchers who haven't been able to pin point as to what would be the optimal drain. In cases a drain is considered necessary by the surgeon. The number of trials in the other comparisons such as 'suction drain compared with passive closed drain', 'open drain compared with no drain' and 'suction drain compared with open drain' so they infer that the application of drain is subjective [21].

Surgical outcomes were analysed with the tissue healing and the complication development as the primary criteria. The number of patients who developed complication also had a relationship with the type of surgical procedure used and the sanitary measures taken by the medical centre or the hospital the patient was admitted at. For our study we have taken into consideration patients from the surgical department of four major hospitals across Yerevan. The first teaching hospital also referred as the 'Heratsi Hospital' of Yerevan State Medical University introduced patients with post-operative drains from procedures like Cholecystectomy, Appendectomy and Gastro-Enteroanastamosis operation. A total of 8 patient records were used for the viewing the trends at the hospital regarding the usage of drainage tubes. The complications regarding the drains ware also noted from this hospital. The second hospital which contributed to the research was 'Mikaelyan Institute of Surgery', Introducing patients from similar procedures as Cholecystectomy, Appendectomy, Peritoneal Abscess and different anastomosis with Stoma operations. A total of 14 patients' records were viewed at the institution and the trends noted. The third hospital was 'Erebuni Medical Centre' which gave us access to patient records for a total of 5 patients who had undergone abdominal surgery with placement of drains, with no complications. The last and the fourth hospital was 'Nairi Medical Centre' who gave us patient records of 6 patients from the surgical department with no noted complications. There were no other significant differences in demographic and clinical characteristics between patients in the drain group with complications and the group without complications.

One of patients who developed complication had been operated for gastro-entero anastomosis and had purulent process leakage from the drain to the skin causing hyperaemia and rash. The patient was immediately taken to the dressing and his drain was cleaned with injection of saline and hyperaemic zone washed with betadine solution and antibiotic ointments applied with an oral prescription for broad spectrum antibiotics for 2 days.

Various trends were noticed during the course of the study. Out of the 33 patients observed for the study, there were seven patients who underwent the procedure of cholecystectomy (two laparoscopic); three patients for hernioplasty , two for colostomy, two for the closure of a sigmoidostomy, three patients for appendectomy, one for rectal cancer resection, two for ileostomy, one for the resection of subhepatic abscess, one for the hydatid cystectomy, one for hepatic resection, one for sigmoid colon tumour resection, one for drainage of pancreatic abscess , one for retroperitoneal abscess drainage, one for saphenous venectomy, two for acute small intestinal bowel resection with one of them having adhesion formation; one for gastro-entero anastomosis, one patient underwent a total gastrectomy.

Two patients developed drain-related complications. A 66 year old male who underwent the Gastro- enteroanastomosis of Billroth II had two drains placed subcutaneously for seven and nine days respectively. One of the drains at the site of the anastomosis, under the proximal loop of jejunum was the source of the complication. The patient developed skin hyperaemia and a mild rash due to the purulent process leakage from the drain. The second patient to have developed drain- related complications underwent a standard splenectomy procedure due to a stab wound causing rupture of the spleen. The drain was placed under the left colic flexure which led to complicated faecal peritonitis due to damage caused by traction while inserting the drainage tube. The norm for removal of drains in cholecystectomy is 2 - 3 days, same for appendectomy. The drainage tube is generally removed when less than 200 ml of serous fluid is collected. The drains are usually placed on the mesh if an autoplasty manipulation is performed during a hernioplasty and it is removed after an average of 7 - 8 days. In the case of the retroperitoneal abscess, A 53 year old female developed purulent wounds due to infected acupuncture needles and

the drains were placed inside the wound cavity. A patient, 43 year old female underwent total gastrectomy due to cancer of the stomach, had two drains inserted in the subhepatic region, one in the pelvic region and one in the left lateral canal of the abdomen.

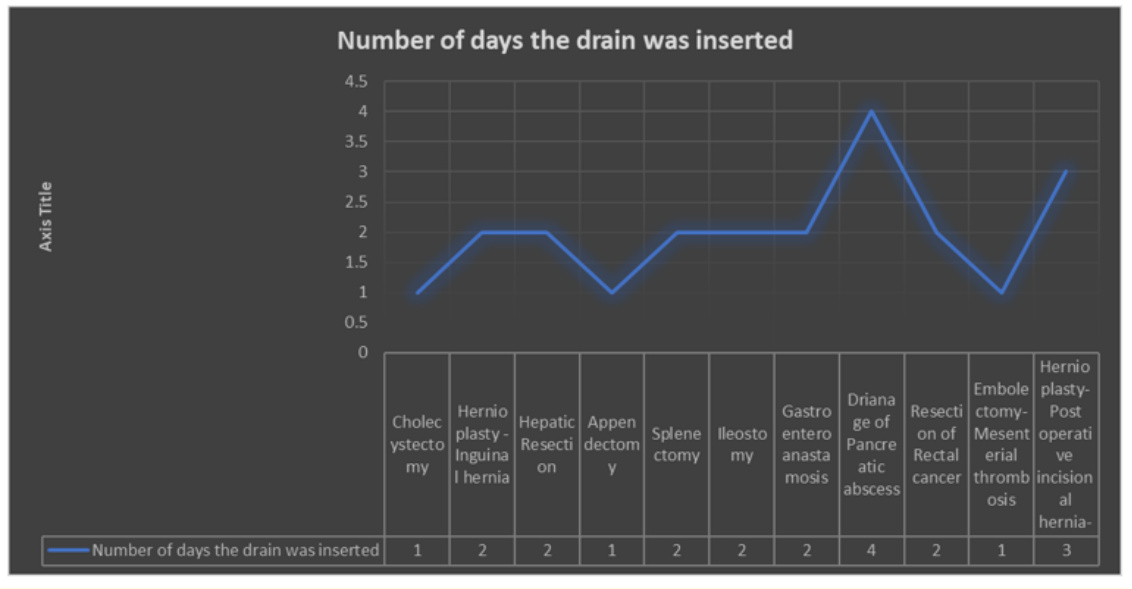

Figure 1: *Denoting the relationship between the type of operation and the number of days the drain was inserted.*

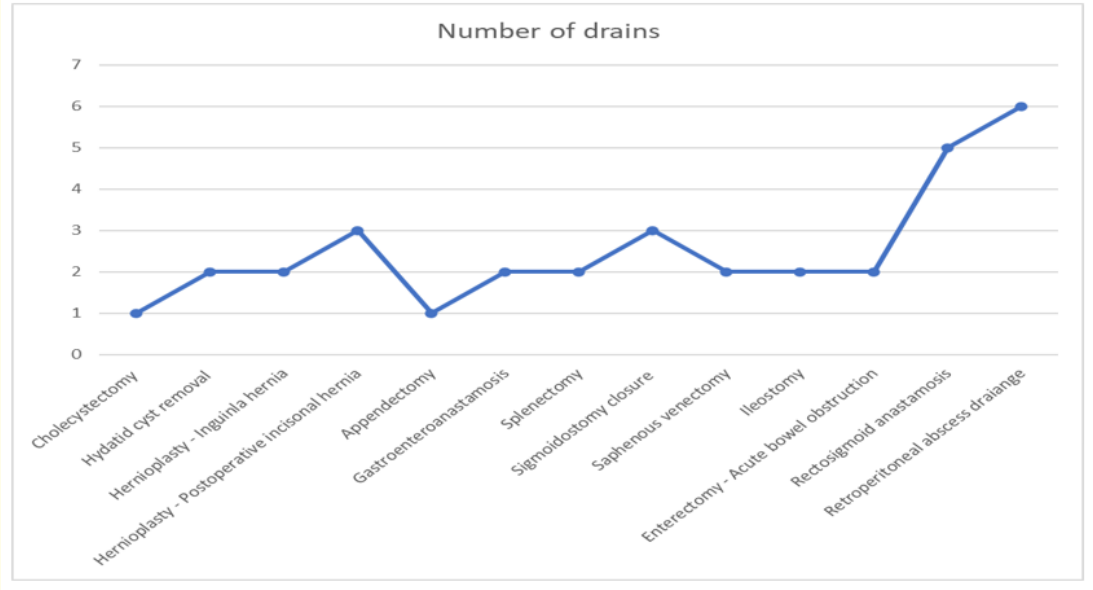

Figure 2.1

Figure 2.2

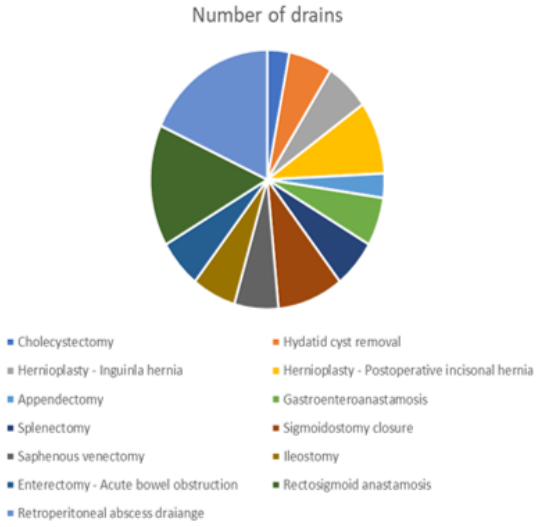

Figure 2.3

Figure 2: *Figure 2.1 (above) and 2.2 and figure 2.3 (below) all give a relationship between the type of operation and the number of days the drain was inserted for the respective type of operation. Here we can compare the maximum amount of drains used and the operations which require minimal drains helping to signify the extent of spread of the purulent process/ infection or liquor.*

Summary

After analyzation of the various trends and the data collected from patients records we come to see various aspects of drainage tubes and their advantages. In the two specific cases which developed complications due to the drainage, they cannot be overlooked as they comprise 6.06% of patients of our whole study. Though the usage of sojourn drainage tubes at the postoperative period has been going on since centuries, an age old practice still has no basis to prove itself as 100% efficient. Various other researchers have found limited advantages of the drainages itself and associate a surge of complications to them. Sometimes complications can also be attributed to iatrogenic causes and one of the major drawbacks of the study could be inability to differentiate whether the complication is associated due to the drainage tube or due to incompetent procedure. This was found by the extensive review conducted by our team. The positive effects however cannot be overseen. Drainage tubes do give us a clear picture of an ongoing purulent process inside the abdomen and help the surgeons understand the healing of the various layers. But at the same time their complications cannot be overlooked and the complications are more associated with the operative techniques and manoeuvres rather than the drain itself. Hence, it is with great responsibility the surgeon or medical practitioner must use the drain in operate wounds.

Acknowledgement

We would like to offer our vote of thanks to General Surgery Department of First Teaching Hospital and Mikaelyan Surgical Institute of Yerevan State Medical University named after Mkhitar Heratsi.

We are also thankful to the Erebuni Medical Centre and Nairi Medical Centre for their kind efforts in providing us with needful data for completing our research.

Conflicts of Interest

The authors have no conflicts of interest. No funding is been accepted or received from above mentioned hospitals or any institutions what so ever. The research is solely done on personal level to understand the effects on drains in post-operative period and their effect on tissue healing with their positive and negative effects.

Bibliography

1. Kim J., *et al.* "Gastric cancer surgery without drains: A prospective randomized trial". *The Journal of Gastrointestinal Surgery* 8.6 (2004): 727-732.
2. Durai R., *et al.* "Use of drains in surgery: a review". *The Journal of Perioperative Practice* 19.6 (2009): 180-186.
3. Branum G., *et al.* "Pancreatic necrosis: Results of necrosectomy, packing, and ultimate closure over drains". *Annals of Surgery* 227.6 (1998): 870-877.
4. Komuta K., *et al.* "Herniation of the small bowel through the port site following removal of drains during laparoscopic surgery". *Digestive Surgery 17*.5 (2000): 544-546.
5. Kumar M., *et al.* "Is prophylactic placement of drains necessary after subtotal gastrectomy?" *World Journal of Gastroenterology* 13.27 (2007): 3738-3741.
6. Chowdri NA., *et al.* "Role of subcutaneous drains in obese patients undergoing elective cholecystectomy: A cohort study". *International Journal of Surgery* 5.6 (2007): 404-407.
7. Mirzai H., *et al.* "Are drains useful for lumbar disc surgery? A prospective, randomized clinical study". *Journal of Spinal Disorders and Techniques* 19.3 (2006): 171-177.
8. Adogwa O., *et al.* "Post-operative drain use in patients undergoing decompression and fusion: incidence of complications and symptomatic hematoma". *Journal of Spine Surgery* 4.2 (2018): 220-226.
9. Li Z., *et al.* "Abdominal drainage to prevent intra-peritoneal abscess after open appendectomy for complicated appendicitis". *Cochrane Database of Systematic Reviews* 5 (2018).
10. Zhou J., *et al.* "Characteristics of abdominal cavity drainage fluid in Chinese patients without postoperative complications after surgery for gastrointestinal or retroperitoneal tumors". *Clinical Interventions in Aging* 10 (2015): 367-370.
11. Berliner SD., *et al.* "Intraperitoneal drains in surgery of the colon". *Clinical Evaluation* of 454 cases". *The American Journal of Surgery* 113.5 (1967): 646-647.
12. Yates JL. "An experimental study of the local effects of peritoneal drainage". *The American Surgeon: SAGE Journals* 21.10 (1955): 1048-1072.
13. Berliner SD., *et al.* "Use and Abuse of Intraperitoneal Drains In Colon Surgery". *Archives of Surgery* 89.4 (1964): 686-690.
14. Molinari E., *et al.* "Amylase value in drains after pancreatic resection as predictive factor of postoperative pancreatic fistula: Results of a prospective study in 137 patients". *Annals of Surgery* 246.2 (2007): 281-287.

15. Walker J. "Patient preparation for safe removal of surgical drains". *Nursing Standard* 21.49 (2007): 39-41.

16. Todd GJ and Reemtsma K. "Cholecystectomy with drainage. Factors influencing wound infection in 1,000 elective cases". *The American Journal of Surgery* 135.5 (1978): 622-623.

17. Moss JP. "Historical and current perspectives on surgical drainage". *Surgery, Gynecology and Obstetrics* 152.4 (1981): 517-527.

18. Dougherty SH and Simmons RL. "The biology and practice of surgical drains part I". *Current Problems in Surgery* 29.8 (1992): 567-623.

19. Cohn I., *et al.* "Retroperitoneal rupture of the duodenum in non-penetrating abdominal trauma". *The American Journal of Surgery* 84.3 (1952): 293-301.

20. Magee C., *et al.* "Potentiation of wound infection by surgical drains". *The American Journal of Surgery* 131.5 (1976): 547-549.

21. Samraj K and Gurusamy KS. "Wound drains following thyroid surgery". *The Cochrane Database of Systematic Reviews* 4 (2007): CD006099.

Volume 4 Issue 3 March 2021