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Original Article

Role of Abdominal Drains in Perforated Peptic Ulcer Patients: A Prospective, Randomized, and Controlled Study

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Abstract

Introduction: Peptic perforation is the second most complication of peptic ulcer disease. It is a serious condition where an untreated peptic ulcer can perforate through the wall of the stomach [or other areas of gastrointestinal tract]. As the peptic ulcer perforates, it allows the digestive juice to gain entry into the abdominal cavity. The penetrating peptic ulcer was penetrating through the duodenum into the free peritoneal cavity and elicit a chemical peritonitis.

Materials and Methods: This prospective, randomized, and controlled study was done in the Department of General Surgery, IPGME and R and Calcutta National Medical College and Hospital, Kolkata. Patients of peptic perforation (D1 perforation) admitted in surgical indoors within 48 h of onset of symptoms and repaired with Roscoe Graham patch closure. Age: 18–65 years, Sex: both male and female.

Results: Burst abdomen is a very serious complication and a cause of morbidity that is a sequel of wound infection. Burst abdomen was significantly higher in with drain patients 4 (16.0%) than without drain patients 0 (0.0%) and this association was statistical significance (Chi-square value = 4.34, $P = 0.03$). Post-operative nausea and vomiting were associated in two groups of the patients. In Group A, post-operative nausea vomiting was more frequently observed in with drain patients 18 (75.0%) than without drain patients 6 (25.0%) and this association has statistical significance (Chi-square value = 11.54, $P < 0.001$) and we have reached to a result that shows that wound infection including stitch line infection is much higher in Group A patients. High wound infection was found in patients with drain 13 (76.5%), compared without drain group patients 4 (23.5%).

Conclusion: If the proper toileting of the abdominal cavity can be achieved with care, there is no role of putting abdominal drains as prophylactic drainage after Graham's patch repair in cases of perforated peptic ulcer diseases mainly D1 perforation.

Key words: Peptic ulcer, Perforation, Tube drain

INTRODUCTION

Peptic perforation is the second most complication of peptic ulcer disease.[1] It is a serious condition where an untreated peptic ulcer can perforate through the wall of the stomach [or other areas of gastrointestinal tract]. As the peptic ulcer perforates, it allows the digestive juice to gain entry into the abdominal cavity.[2] The penetrating peptic ulcer will penetrate through the duodenum into the free peritoneal cavity and elicit a chemical peritonitis.

Patients of peptic perforation usually present with the upper abdominal pain to start with. Patient can typically recall the exact time of onset of abdominal pain. As time passes, the pain abdomen is accompanied by the onset of fever, vomiting, and respiratory distress. As time progresses, peritonitis starts to build up and patient experiencing pain all over the abdomen. Clinical examination shows tachycardia, low blood pressure, and dehydration. Per abdominal finding reveals an exquisite tenderness over abdomen, absent intestinal peristaltic sounds, card board rigidity of the abdomen, positive rebound tenderness,

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and most importantly obliteration of liver dullness. A hallmark of free perforation is the demonstration of free air underneath the diaphragm on an upright chest radiograph.[3] Many of the perforated ulcers have been attributed to the bacteria *Helicobacter pylori*. The incidence of perforated ulcer is steadily declining, though there is a still incidence where it occurs. Causes include smoking and non-steroidal anti-inflammatory drugs.[4] Peptic perforation mainly D1 perforation the deadly complication of peptic ulcer disease is a surgical emergency. After the diagnosis is made, operation is performed in an expeditious fashion following appropriate fluid resuscitation.[3] Surgery is almost always indicated, although occasionally non-surgical treatment can be used in stable patient without peritonitis if there is sealed perforation.[1] However, in this study, we are only considering non-sealed D1 perforation. The options for surgical treatment of D1 perforation are simple omental Graham's patch repair, patch closure and highly selective vagotomy, patch closure, and vagotomy + Drainage.[1] Here, we are only considering simple Graham's patch repair. There has been an ongoing discussion about the requirement of routine usage of abdominal drains in post-operative cases of simple omental patch repair of D1 perforations. My study seeks to investigate the pros and cons of abdominal drain usage in peptic perforation patients undergoing Graham's patch closure concerning D1 perforation.

Aims

The present practice is to leave two tube drains: One in the Morrison's pouch and one in the pelvis after omental patch closure in cases of perforated peptic ulcer (D1) patients.

This study is going to be conducted to test the efficacy and safety of drain usage routinely after duodenal ulcer perforation (D1 perforation) closure with Roscoe Graham omental patch technique by dividing the whole study into two groups such as Group A and Group B. Group A patients are those who were given abdominal drains intraoperatively in pelvis and Group B patients are those who were not given any drains in the abdomen intraoperatively.

Specific Objective of the Study

The specific objectives of the study are as follows:

1. Compare post-operative morbidity profile between the two groups
2. Comparison of mean hospital stay between the two groups
3. To study the incidence of any intra- abdominal collection in these patients undergoing the study by radiological imaging done on 3rd post-operative day in both groups like ultrasonography (USG)
4. To determine the occurrence of drain site complications
5. To notice the average drain output and nature of drainage fluid in patients given with drain
6. To notice and compare average time for the return of bowel activity in both arms.

MATERIALS AND METHODS

Study Area

The study was conducted at Department of General Surgery, IPGME and R and Calcutta National Medical College and Hospital, Kolkata.

Study Population

Patients admitted in surgical indoors.

Study Period

The study period was 1 ½ years.

Inclusion Criteria

The following criteria were included in the study:

Patients of peptic perforation (D1 perforation) admitted in surgical indoors within 48 h of onset of symptoms and repaired with Roscoe Graham patch closure.

- Age: 18–65 years
- Sex: Both male and female
- Type of surgery: Emergency
- Must be willing to give written informed consent.

Exclusion Criteria

The following criteria were excluded from the study:

- Age out of range [<18 year and >65 year]
- Patient having known bleeding diathesis
- Patients with traumatic gastric/duodenal perforation
- Malignant pathology
- Patients with any other hollow organ perforation
- Patients with chronic liver failure/renal failure/ congestive cardiac failure
- Pregnant women
- Any other clinical condition perceived by the investigator as not conducive to be included in the study.

Study Design

This study was a prospective, randomized, and controlled study.

Sample Size

The sample size was 50 patients.

RESULTS AND DISCUSSION

In this work, we have selected 50 patients, all having peptic perforation (D1 perforation), admitted in the surgical

Table 1: Wound infection and USG whole abdomen to see abdominal and pelvic collection done 3rd post-operative day of the two groups patients

	Group		
	With drain	Without drain	Total
Wound Infection			
No	12	21	33
Row %	36.4	63.6	100.0
Col %	48.0	84.0	66.0
Yes	13	4	17
Row %	76.5	23.5	100.0
Col %	52.0	16.0	34.0
Total	25	25	50
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0
USG whole abdomen to see Abdominal and pelvic collection done 3rd post-operative day			
Mild Pelvic, Interloop	5	4	9
Row %	55.6	44.4	100.0
Col %	20.0	16.0	18.0
Mild Pelvic	4	3	7
Row %	57.1	42.9	100.0
Col %	16.0	12.0	14.0
Minimal Pelvic	9	13	22
Row %	40.9	59.1	100.0
Col %	36.0	52.0	44.0
Moderate Pelvic	6	1	7
Row %	85.7	14.3	100.0
Col %	24.0	4.0	14.0
No	1	4	5
Row %	20.0	80.0	100.0
Col %	4.0	16.0	10.0
Total	25	25	50
Row %	50.0	50.0	100.0
Col %	100.0	100.0	100.0

USG: Ultrasonography

indoor after proper clinical examination such as obliteration of liver dullness, card board rigidity of abdomen, absent IPS, rebound tenderness, and radiological imaging such as demonstration of free air under right dome of diaphragm in straight X-ray abdomen in erect posture/ straight X-ray chest. All these patients were operated after proper resuscitation with iv fluids, iv antibiotics, and catheterization. The early arrival to our hospital may be due to early diagnosis of acute abdomen or the perforation was diagnosed early by the general physician and also the quick availability of the medical services and transport system. We performed Roscoe Graham patch closure of all the 50 cases of D1 perforation followed by thorough peritoneal toileting with normal saline. Thereafter, we placed abdominal drain kit-no 32 in pelvis in Group A patients (those who were given abdominal drains intraoperatively in pelvis) and closed the abdomen without placing drain in the abdominal cavity in Group B patients (those who were not given any drains in the abdomen intraoperatively) as per this study design. We thoroughly followed the post-operative course of both groups of patients. As previously discussed in this study objective, we are considering different parameters to be studied in both groups of patients. Our study wants to establish the pros and cons of abdominal drain, comparing both groups of patients.

We have achieved a result that shows that wound infection including stitch line infection is much higher in Group A patients. High wound infection was found in patients (76.5%) with drain, compared with without drain Group B patients (23.5%). Test of proportion showed that the proportion of with drain group was significantly higher than without drain group (Chi-square value = 5.70; $P < 0.01$). Pessaux *et al*. suggested that drains act as a foreign body and increase the risk of infection. Boey *et al*. showed 36% wound infection rate in their study in Ann 1987 January.[5] Another parameter the result shows that drain site infection in Group A patients is 17 in number and incidence is 68.0%. It is a well-known fact that drain always invites infection and acts as a foreign material at drain site. This high infection rate, like wound infection and drain site infection compel us to rethink and go against the conventional age old approach of putting abdominal drains intraoperatively. In the study shown by Schein in to drain or not to drain? the role of drainage in the contaminated and infected abdomen: An international and personal perspective, World Journal of surgery 2008, 32(2): 312-321,[6] showed that drain site infection is about 10%. In this study, drain site infection is higher than that study. Hence, it is obvious that drain site infection is a well-established morbidity in patients given drains after repair of peptic perforation. Paul *et al*. in their study, prophylactic abdominal drains, got bacterial growths from cultures of the interior portion of their drains, on removal, revealed that in 17 out of 50 of these patients, there were definite skin contaminants on the interior part of their drains. These findings strongly suggest that bacteria do migrate through the drain into the interior. The authors seriously question the routine placement of prophylactic abdominal drains, in view of the increased virulence reported even among commensal microorganisms which migrate down these drains.[7]

Looking into another parameter, such as post-operative fever, here also results is in favor of non-drain group (Group-B). In Group A, post-operative fever was more frequently observed in with drain patients: 22 (73.3%) than without drain patients 8 (26.7%) in Group B and this finding was statistically significant (Chi-square value = 14.08. $P < 0.001$). Higher incidence of fever in Group A was due to high incidence of wound infection and drain site infection in this Group. Pai *et al*.[8] in their study showed that post-operative fever was significantly lower in the non-drain group as compared to drain group. The result of this study corroborates with those studies.

Burst abdomen, sequel of wound infection, is a very serious complication and morbidity to the patients. Burst abdomen was significantly higher in drain group patients numbering 4 patients (16.0%), than without drain group patients 0 (0.0%) and this finding was statistically significant (Chi-square value = 4.34 $P = 0.03$). The age of the patients experiencing burst abdomen is 46 years, 48 years, 60 years, and 40 years. It shows that the prevalence of burst abdomen is higher in older age group. Waquar *et al*. in their study shows that risk of wound dehiscence and burst abdomen increases with advancing age. They showed incidence of wound dehiscence was 57% above age 50.[9] The incidence of several other parameters, the signature of post-operative morbidity, like post-operative nausea vomiting, post-operative abdominal distension, post-operative abdominal pain, and drain site pain, all are higher in Group A patients.

Post-operative nausea vomiting was associated with two groups of the patients. In Group A, post-operative nausea vomiting was more frequently observed in with drain 18 patients (75.0) than without drain 6 patients (25.0%) and this association was statistically significant (Chi-square value = 11. 54, $P < 0.001$). The previous studies by Ansari *et al*. and Petrowsky *et al*. showed increased incidence of nausea and vomiting in patients of drain group in respect to non-drain group. Prolonged immobilization, prolonged antibiotic course to combat wound infection, and drain site infection are the causative factor more incidence of nausea and vomiting in drain group (Group A) patients in this study.

Post-operative abdominal distension was statistically higher in with drain group patients 14 (56.0%) than without drain group patients 4 (16.0%) and this association was statistically significant (Chi-square value = 7.03, $P = 0.008$). Ansari *et al*. found that there was no significant difference between the no drain and drain groups with respect to the post-operative abdominal distension, Pai *et al*. showed mild difference in respect to postoperative abdominal distension between the non-drain and drain group patients. This study shows different results from them. Increased time for the return of bowel activity, and prolonged immobilization, increased infection rate, and all seem to be the risk factor for the increased incidence of postoperative abdominal distension in Group A patients.

Post-operative abdominal pain was statistically higher in with drain patients number that is 23 patients (92.0%) than without drain patients number is 13 patients (52.0%) and this finding was statistically significant (Chi-Square value = 8.03, p= 0.004). All the previous studies by Ansari *et al*., Petrowsky *et al*., and Pai *et al*. showed significant difference between with drain and non-drain group in respect to post-operative abdominal distension. This study corroborates with their study. Extra wound for drain, drain site infection, wound infection, wound dehiscence, and all are the causative factor for the high incidence of post-operative abdominal pain in with drain group (Group-A).

Drain site pain is also a parameter in the study. It is also a known parameter of post-operative morbidity. It is only observed in Group A patients. Out of 25 patients, 22 patients experienced pain in the drain site postoperatively. This value is very high and this increased the morbidity to these patients. The incidence is 88% in this Group. Rathi *et al*. in their study entitled "Laparoscopic Cholecystectomy without the use of drain in selected cases" concludes that the use of abdominal drain has been found to be associated with significant drain site pain/discomfort, incidence being 26%.[10] Other studies related to peptic perforation, drain, and non-drain also showed a significant incidence of drain site pain. In this study, the incidence is much higher. Drain site infection also contributes to the high incidence of drain site pain in Group A patients. From the previous literature, it is a well-known fact that maximum patients experience discomfort and pain during removal of all kinds of drain particularly abdominal drains. This study does not differ from this fact. During removal of drains on 5th postoperative day, nearly all patients in Group A experienced discomfort and pain. As the incidence of wound infection, drain site infection, burst abdomen, post-operative fever, drain site discomfort, and pain are much higher in Group A patients naturally average time for duration of hospital stay increases in Group A patients. In Group A, the mean duration of hospital stay (mean $\pm$ S.D) of patients was 11.88 $\pm$ 1.72 days and in Group B, the mean duration of hospital stay of patients was 7.32 $\pm$ 0.69 days. As the mean duration of hospital stay increases in Group A patients, chance of nosocomial infection is high in these group. Many literature proved this previously as, Sheng *et al*. in their study "impact of nosocomial infections on medical costs, hospital stay, and outcome in hospitalized patients" "concluded that nosocomial infections have a significant impact on the length of hospital stay and medical care cost.[11]

Return of bowel activity was compared in both Group pts. In with drain patients, return their bowel activity was 4 (16.0%) in day 2, 18 (72.0%) in day 3, 3 (12.0%) in day 4, but in without drain patient, return their bowel activity was 17 (68.0%) in day 1 and 8 (32.0%) in day 2. Return of intestinal peristaltic sound came early in without drain patients compared to with drain patients and this finding was statistically significant (Chi-square value = 39.33, $P < 0.001$). Pai *et al*. found no significant difference between drain and non-drain group in respect to return of bowel activity in post-operative period.

In Group A, the mean average drain output per day (mean ± S.D.) of patients was 33.46 ± 15.97 ml/day with range 10–70 ml/day and the median average drain output per day was 34 ml/day. Mean drain output <25 ml/day observed in 12 patients, and mean drain output between 25 ml/day and 50 ml/day observed in 11 patients, and mean drain output >50 ml/day observed in two patients. The nature of the content being mostly serosanguinous and sangiunous. There is no evidence of bile, pus, intestinal content in the drainage bag, indicating no post-operative leak, and major intra-abdominal collection of pus. The amount of drain output is negligible in 23 patients. In addition, drains should be removed once the drainage has stopped or becomes <25 ml/day. This can be applied in majority of patients of Group A. Memon *et al.* suggested that "Drains are not substitute for good surgical technique."[12]

Abdominal and pelvic collection evaluated in both group of patients. In Group A patients, USG whole abdomen to see abdominal and pelvic collection, done on 3rd post-operative day, 5 (20.0%) patients showed mild 4 (16.0%) patients showed mild pelvic, 9 (36.0%) patients showed minimal pelvic, 6 (24.0%)patients showed moderate pelvic, and 1 (4.0%) patients showed no collection. In Group B patients, 4 (16.0%) patients showed mild pelvic and interloop collection, 3 (12.0%) patients showed mild pelvic, 13 (52.0%) patients showed minimal pelvic, 1 (4.0%) patients showed moderate pelvic, and 4 (16.0%) patients showed no collection, and this association was not statistically significant (Chi-square value = 6.35, $P = 0.17$). It is clear from the above discussion that both drain and non-drain group developed post-operative abdominal and pelvic collection. Pai *et al.* concluded that routine use of drains was not effective in preventing post-operative fluid collection nor in decreasing the incidence of intra-abdominal abscesses.[8] Per rectal examination to see pelvic collection was observed in drain group (Group A), incidence being 24%, and in without drain group, it is 32%. It can be concluded from this result that one of the main functions of abdominal drains to drain the abdominal and pelvic collection gone in darkness. Two patients out of 25 in Group A, that is with drain group, died. Age of these patients is 46 years and 48 years. Those two patients also experienced burst abdomen and mild-to-moderate pelvic and interloop collection on the ultrasonographic evaluation. Probably sepsis contributes to these mortality [Table 1].

CONCLUSION

In this study, drain-related complications are high. Morbidity and mortality profile is higher in drain group patients in comparison to non-drain group. It is very obvious from this study that putting abdominal drains in cases of peptic perforation (D1 perforation) offer no extra advantage in respect to non-drain group, rather it increases the complication rate.

Hence, if the proper toileting of the abdominal cavity can be achieved with care, there is no role of putting abdominal drains as prophylactic drainage, in cases of perforated peptic ulcer diseases mainly D1 perforation.

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