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Systemic Review of Open Abdomen versus Primary Closure after Emergency Laparotomy for Peritonitis: Experience in Qazi Hussain Ahmed Medical Complex, Nowshera, Pakistan.

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Systemic Review of Open Abdomen versus Primary Closure after Emergency Laparotomy for Peritonitis: Experience in Qazi Hussain Ahmed Medical Complex, Nowshera, Pakistan.

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ABSTRACT

Objective: In secondary peritonitis patients, optimal management after index laparotomy is poorly defined. Although an open abdomen or temporary abdominal closure with planned relaparotomy is used to reassess bowel viability or contamination severity, recent studies show that primary abdominal closure has comparable morbidity and mortality. The differences between Open Abdomen (OP) and Primary Closure (PC) after emergent laparotomy are examined in this study.

Material and Methods: A systemic review on open abdomen versus primary closure after emergency laparotomy for peritonitis from January 2017 to December 2021 were analyzed. This systemic review was conducted in the department of surgical Qazi Hussain Ahmad Medical complex, Nowshera, Pakistan with approval from the hospital ethical and research committee. The study enrolled 200 patients who met the eligibility requirements. A lottery method was used to divide the patients into two groups at random. Patients with secondary peritonitis requiring emergent laparotomy were identified (N = 200) using the Premier database at a quaternary level. Mannheim Peritonitis Index, lactate, and vasopressor requirement were used to perform propensity matching for PC (n = 100; 65%) or OA (n = 100; 35%). A total of 200 closely matched pairs (PC: OA) were examined.

Results: About 65 percent of the 200 women patients enrolled in the study had an emergency laparotomy (mean age of 52.2 years). Only one relaparotomy was performed on 100 (65.0%) of the (O.A) patients, while 35 (35.0%) had multiple reoperations. Overnight (4 pm–4 am) laparotomies had more temporary closures with O.A (35.0 percent OA vs. 65.0 percent PC, p = 0.05) than daytime laparotomies. Surgical subspecialties performed PC in 82.1 percent of laparotomies, compared to 35.0 percent (p 0.0002) of acute care surgeons. Postoperative complications and n-100 (65.0 percent vs. 35.0 percent, p = 0.0002), mortality (18.0 percent vs. 09.2 percent, p = 0.005), and a longer median length of stay (12 vs. 12 days p = 0.0001) were all higher in OA patients.

Conclusion: The study's systemic review revealed that compared to PC, the complications, mortality rates, and costs associated with OA were significantly higher. Given these findings, more research is needed to determine appropriate OA indications.

Keywords: *Systematic review, Open abdomen, primary closure, emergency laparotomy, Peritonitis*

INTRODUCTION

General surgeons all over the world deal with peritonitis, which is one of the most common surgical emergencies.^{1,2} With the development of new operative techniques, the introduction of antibiotics, and intensive care treatment, peritonitis mortality has decreased to an average of 30–40% since 1926.³ Abdominal trauma is a common cause of secondary peritonitis.⁴ Peritoneal dialysis; appendicitis; necrotizing enter colitis bile or chemicals released by the pancreas (pancreatic enzymes) can also leak into the lining of the abdominal cavity, causing secondary peritonitis.^{5,6} After emergency, primary closure is more effective than immediate primary closure in a contaminated and dirty abdominal wound. Surgery is still used to treat peritoneal peritonitis.⁷ A vertical midline incision is made which is the incision of choice in most patients with generalized peritonitis because it allows access to the entire peritoneal cavity.⁸ Incisions in the abdomen for peritonitis are considered dirty, and they increase the risk of surgical wound infection/surgical site infection (SSI), wound dehiscence, and incisional hernia. The two abdominal wound closure methods are primary wound closure and post-emergency primary wound closure⁹. The best method for closing dirty wounds has remained a point of contention to this day.¹¹ The purpose of this study was to compare the frequency of wound infection in patients who had a primary or secondary skin wound closure after an emergency laparotomy for peritonitis in order to determine the best method of skin closure.

MATERIALS AND METHODS

This systemic review was carried out in the department of surgical the Qazi Hussain Ahmad Medical complex, Nowshera, Pakistan from January 2017 to December 2021. Open abdomen versus primary closure after emergency laparotomy for peritonitis were analyzed with permission from the hospital's ethical and research committee. The study included a total of 200 patients who met the inclusion criteria. Criteria for inclusion were all patients with generalized peritonitis, adult patients aged 14 and above, and any gender. Criteria for exclusion were diabetes patients (fasting blood sugar level > 124mg/dl), the patient with a history of using steroids, if medical records show that a patient has chronic liver disease and if HIV/AIDs diagnoses are documented in medical records. Patients who met the inclusion criteria were enrolled in the study through the OPD/ER department. The diagnosis of generalized peritonitis was based on clinical and radiologic findings. All patients who were included in the study provided informed consent. The patients were divided into two groups at random using a lottery system. Patients in group A had Primary closure of the midline abdominal wound after emergency laparotomy, while patients in group B had After emergency Primary closure of the midline abdominal wound. All patients were given a detailed history, followed by a complete physical examination and a full set of routine investigations. Both groups of patients underwent midline laparotomy.

All patients were kept in the surgical ward for 5 days after emergency surgery and discharged on the sixth post-operative day if indicated. All patients were advised to return for a follow-up visit on the 5th, 14th, and 26th post-closure days to determine effectiveness in terms of surgical site infection in both groups. SPSS version 24 was used to enter and analyses all of the data. For categorical variables such as gender and effectiveness, frequencies and percentages were calculated. For numerical variables such as age, mean+SD was calculated. To compare the effectiveness of the two groups, the Chi-Square test was used. A P-value of 0.05 was deemed

significant. To determine the effect modifiers, effectiveness in both groups was stratified by age and gender. All of the findings were presented in the form of tables and graphs.

Primary closure: This wound was closed with propene 2/0 interrupted sutures at the end of surgery, and the stitches were opened on the 10th post-operative day. **After emergency:** The wound was closed as a Primary closure on the fourth post-operative day in this case. On the tenth day of secondary closure, the stitches were opened. Its efficacy was determined in terms of surgical site infection. If there was no surgical site infection (SSI) 28 days after emergency, the wound was closed and the procedure was considered effective. It was identified by the presence of the following characteristics: Pain greater than 3 on the visual analogue scale as determined by history, redness at the wound site as determined by clinical examination, and purulent discharge from the wound confirmed by laboratory culture.

Data collection and analysis

For each trial, the researchers extracted data and assessed the risk of bias. They calculated a summary risk ratio (RR) for the review's outcomes, which were all dichotomous. Based on the heterogeneity observed throughout the studies and analyses, random effects modelling was used. A priori planned subgroup analysis was completed for each outcome, excluding studies in which the interventions being compared differed by more than one component. These outcomes were excluded because they would make it impossible to determine which variable influenced the outcome or the possibility of a synergistic effect. Sensitivity analysis was carried out to exclude trials that had at least one trait with a high risk of bias. The SPSS version 24 guidelines were used to assess the evidence's quality.

RESULTS

The purpose of this systematic review was on open abdomen versus primary closure after emergency laparotomy for peritonitis in the Department of surgical Qazi Hussain Ahmad Medical complex, Nowshera, Pakistan. The patients were split into two groups. In group A, after emergency with prolene 2/0 was used, whereas in group B, the skin wound was left open for three days and daily dressing with saline-soaked sterile gauze was used, followed by skin wound closure on the fourth post-OP day. Group A had a median of 42-year ranging from 18 to 61 years. The average age was 31.13+ 13.895 (standard deviation) years, whereas the median age in group B was 48 years old and ranging from 18 to 61 years. The average age in group B was 30.61 + 13.362 years (standard deviation). There was no statistically significant difference in age between the two groups. (The p-value was 0.603.) In group A, 35 patients (35%) were male while 65 (65%) were female. The male to female ratio in group B was 1.86, with 65 (65 %) of patients being male and 35 (35%) being female. Out of 100 patients in study group A, 63% had normal wound healing and 37 (37%) had SSI, with a 63% effective rate. About 86% percent of patients in study group B had normal wound healing, while 14% had after emergency wound healing. Patients developed SSI at a rate of 14%, with an effectiveness of 86%. The researchers used the chi square in this study to test if there was a significant difference between the two groups. In terms of surgical site infection, the difference between the two groups was statistically significant with a P value of 0.05. The study findings are summarized in figures 1, 2, 3 and tables 1 to 4. Wound healing was found to be 96% percent in group A and 91% percent in group B.

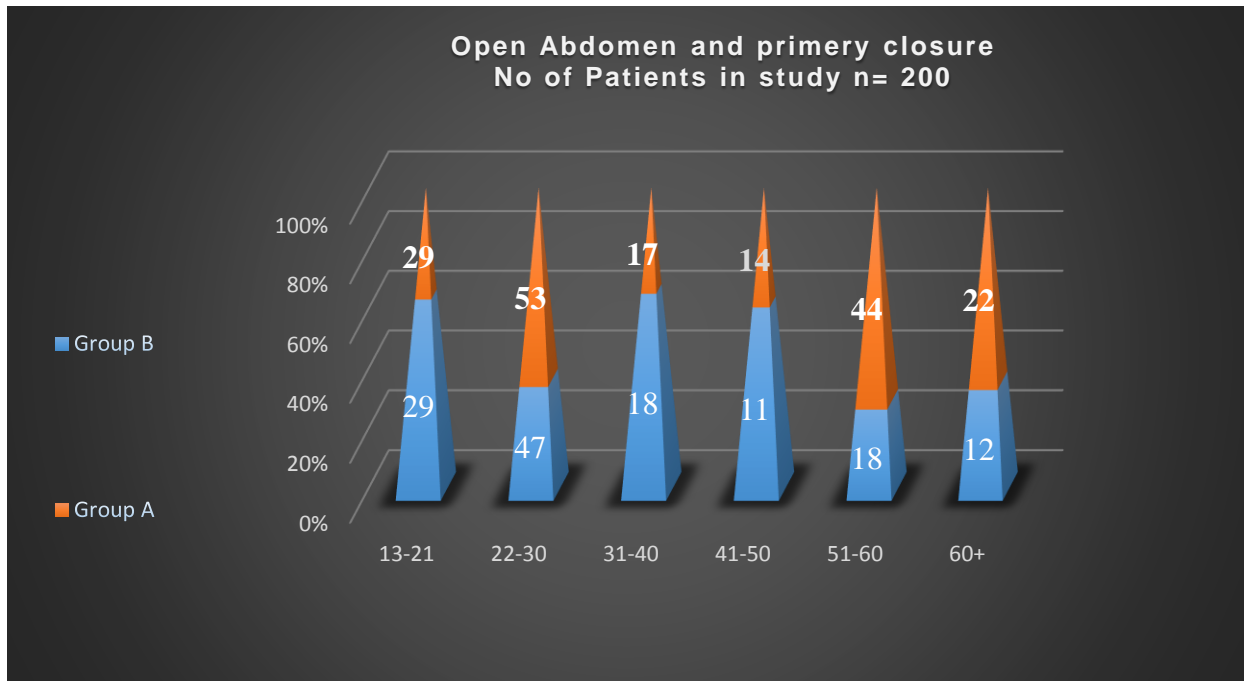


Figure 1: Open abdomen and primary closure for group A and group B

The group A of patients has an open abdomen, while the group B has a primary closure.

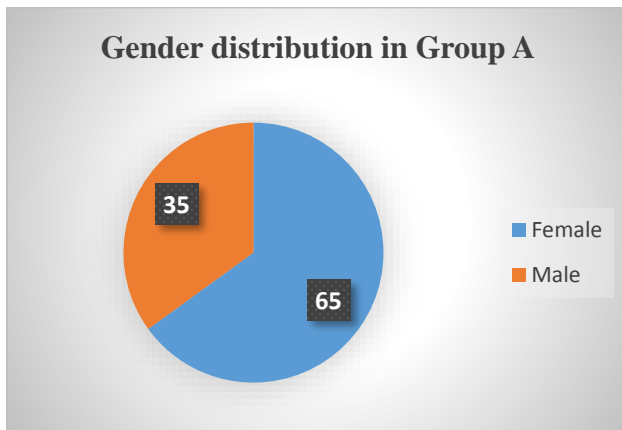


Figure 2: Gender distribution in Group A

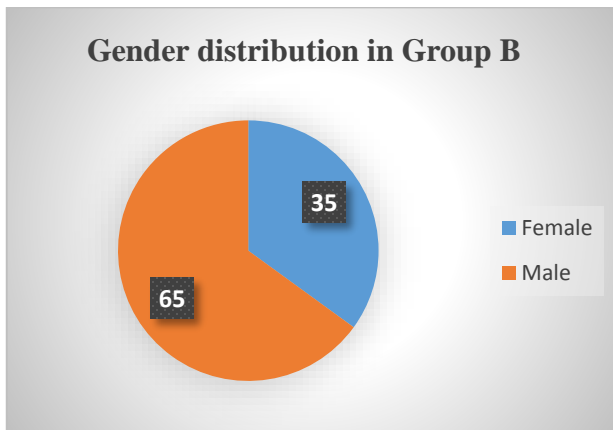


Figure 3: Gender distribution in Group B

Table 1: Results of wound healing for patients in group A

RESULTS	N	%
Normal wound healing	63	63
Surgical side infection (SSI)	37	37
Total	100	100%

Table 2: Results of wound healing for patients in group B

RESULTS	N	%
Normal wound healing	86	86
Surgical side infection (SSI)	14	14
Total	100	100

Table 3: Cross tabulation of frequency of SSI in group A and group B

	Normal wound healing	Surgical side infection (SSI)	
Group A	63 (31.5%)	37 (18.5%)	100 (50%)
Group B	86 (43%)	14 (7%)	100 (50%)
Total	149 (74.5%)	51 (25.5%)	200 (100%)

Table 4: Age distribution for both groups A and group B

Interval Age	Number of Patients	Percentage of Patients (%)
20-22	30	15
23-34	50	25
35-40	30	15
41-50	50	25
51-61	40	20
	N = 200	100

P-value = 0.603

DISCUSSION

Nosocomial infections are deemed a major public health problem occurring all over the world causing thousands of deaths annually in the developed countries. Surgical site infections along with urinary tract infections, pneumonia and blood borne infections, are ranked as the second most common type of nosocomial infections. Siddiqui et.al (2011) observed that there is no surgical procedure which is free from the risk of surgical site infection despite advances in surgical techniques, use of antibiotic prophylaxis and efforts to control it. Siddiqui et.al (2011) reported that almost 5% of patients undergoing any kind of surgery develop surgical site infections (SSIs) of which up to two thirds are incisional SSIs. Surgical abdominal wounds may be divided into clean and contaminated. The rate of SSIs is high as evident from various local and international studies. Dirty abdominal wounds related to perforated appendicitis, other perforated viscous, traumatic injuries, or intra-abdominal abscesses were analyzed. This study showed that high rate SSI in dirty abdominal wounds is 38-58% when closed primarily.

After emergency, primary closure of contemn innate wounds was utilized frequently during World War I, well before the discovery of antibiotics^{10,11}. Despite the benefit of this technique in war wounds, it was not used frequently in civilian practice.¹⁴ Although ABWC is better than BWC, it is associated with patient fear especially in young age.¹² In this study, Group A had a median of 42 year ranging from 18 to 61 years. The average age was 31.13+ 13.895 (standard deviation) years, whereas the median age in group B was 48 years old and ranging from 18 to 61 years. The average age in group B was 30.61 + 13.362 years (standard deviation). There was no statistically significant difference in age between the two groups. In this study there were 100 male and 100 female. There was no statistically significant difference for developing wound infection in a particular gender (P value=0.06). Out of 100 patients in study group A, 63% had normal wound healing and 37 (37%) had SSI, with a 63% effective rate. About 86% percent of patients in study group B had normal wound healing, while 14% had after emergency wound healing. Patients developed SSI at a rate of 14%, with an effectiveness of 86%. This study shows that there was significantly less SSI in the After emergency Primary closure group when compared to Primary closure with a p-value (<0.05).

A prospectively randomized study of 81 patients with dirty abdominal incisions showed that SSI developed in 42.5% of incisions closed primarily compared to 2.7% for After emergency Primary closure. That study was in accordance with the findings of this study.¹⁵ However, the rate of wound infection is much higher compared to this study's results. In contrast, some studies shows high wound infection in After emergency Primary closure group. There are certain aspects of delay primary after closure that may reduce the rate of SSI. This include improved blood flow at the wound edges, which develops increasingly over the first few days resulting in increased resistance to infections by delivery of functional phagocytes to the wound site, increasing through the first 7 to 9 days.¹⁶ Another extension of this concept, negative pressure wound therapy has been used as a bridge, to close contaminated wounds.¹⁶ Vacuum-assisted closure has also been used for the treatment of dirty abdominal wounds to assist in facial closure and in large open wounds because there are several advantages including the removal of exudate and acceleration of the development of granulation tissue. In this trial, the patients who developed SSI in both the groups were managed with antibiotic and daily wound lavage, debridement on demand, daily dressing and closure by secondary in tensions.

CONCLUSION

The study's systemic review revealed that one-third of those requiring multiple reoperations required multiple reoperations. When compared to PC, the complications, mortality rates, and costs associated with OA were significantly higher. Given these findings, more research is needed to determine appropriate OA indications.

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