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Comparative Outcome of Wedge Excision of Perforation Site and Trimming of Perforation Margin Followed by Primary Repair in Treating Ileal Perforation

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Abstract **Original Research Article**

Background: Every gastrointestinal (GI) surgeon faces significant challenges when treating ileal perforation. The most common causes of ileal perforations are typhoid ulcers and trauma. The patient with an ileal perforation presents a number of challenges to the gastrointestinal surgeon, and understanding the relevant anatomy, physiology, and metabolism is required to address these challenges effectively. ***Aim of the Study:*** This study compared the results of ileal perforation management procedures including primary repair after trimming of the perforation margin and wedge excision of the perforated site. ***Methods:*** Between January 2021 and June 2022, this prospective observational study was carried out at 250 Bedded General Hospital, Naogaon & Clinic in Naogaon, Bangladesh. This study included 44 patients in total as study participants. According to how many patients there were, the total number of participants was split into two equal groups. 22 patients in Group I underwent wedge excision of the perforation site, and another 22 patients in Group II underwent perforation margin trimming followed by a primary repair procedure. All participants provided proper written consent prior to the collection of data. Patients between the ages of 15 and 70 were included in this study in accordance with the inclusion criteria. The data was gathered using a predesigned questionnaire. ***Results:*** All patients underwent primary repair after either wedge excision of the perforated site (Group I) or trimming of the perforation margin (Group II). The rates of fever, abdominal distention, constipation, and vomiting were higher in both patient groups. Both groups of patients experienced similar levels of abdominal pain, fever, abdominal distension, constipation, and vomiting. In groups I and II, post-operative fever was noted in 14 (63.5%) and 18 (81.8%) patients, respectively. The difference was statistically significant ($p<0.05$) in the chi square test. There were 13 cases of wound infection (59.1%) in group I and 18 cases (81.8%) in group II. Additionally, the chi square test indicated that the difference was statistically significant ($p< 0.05$). 6 (27.2%) in group I and 13 (59.1%) in group II showed anastomotic leakage. ***Conclusion:*** Regarding post-operative mortality and morbidity, wedge excision followed by primary repair is preferable in certain patients to treat ileal perforation.

Keywords: Mortality, Epidemiology, Morbidity, Ileal Perforation, Abdominal distention, Excision.

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INTRODUCTION

The terminal ileum perforation is a common surgical emergency in the tropics. The fifth most common cause of abdominal crisis is reported to be enteric fever, which is also highly prevalent in this region along with tuberculosis. Ileal perforation has a variety of different causes in tropical countries like Bangladesh. Typhoid enteritis is reportedly the most common cause of ileal perforation. Other potential causes include conditions like ascariasis and Crohn's disease [1]. According to reports, in developed nations, these perforations are primarily brought on by foreign objects, radiotherapy, medications, Crohn's disease, cancer, and congenital anomalies. A perforation of the terminal ileum, which results in unknown peritonitis, is what causes the abdominal pain to get worse. This pain is most noticeable over the right iliac fossa and is

accompanied by tenderness, rigidity, and guarding [2]. However, there may be concealed clinical signs in a significant number of patients with a serious toxic condition, delaying identification and requiring prompt surgical intervention. Despite the availability of cutting-edge diagnostic facilities and improvements in treatment protocols, this illness is still associated with a high mortality rate and unavoidable morbidity [1]. Typhoid perforation management requires surgery, which is now widely accepted [3]. It has been shown that a successful resuscitation, correction of electrolyte disruption, appropriate antimicrobial therapy, and surgery are all necessary for a positive outcome [1]. Despite the fact that the ideal course of treatment for the pathology has not yet been established, it is currently recommended that every patient who has an ileal perforation undergo surgery after receiving the proper resuscitation [4]. There are many different viewpoints on the type of surgery that should be done. The diagnosis of ileal perforation and the best surgical treatment for it are still up for debate [2]. Bitar and Tapley's review suggested "doing as much as necessary but as little as possible" with the intention of performing a speedy operation to halt the contamination and remove the current collection. The best surgical option should be carefully selected based on the patient's overall health, the location and number of perforations, and the degree of peritoneal soiling. There are many surgical options available [5]. There are three options: closing the perforation, ileostomy, and side-to-side anastomosis [6]. The peritoneum needs to be thoroughly lavaged. Ileal perforation brought on by typhoid enteritis is one of the most common surgical emergencies in our country [7]. It is more prevalent in our country due to improper sewage disposal, illiteracy, incorrect, ineffective treatment, and is typically accompanied by high mortality and morbidity because there aren't as many readily available resources and medical institutions. Infection of the wound (32.0%), wound dehiscence (12.0%), fecal fistula (6.0%), residual intra-abdominal abscess (12.0%), septicemia (4.0%), respiratory complications (32.0%), and cardiac failure due to pulmonary edema (4.0%) are just a few of the numerous post-operative complications that can occur [8]. The surgical approach used to treat the perforation is directly related to all of these problems, especially the two that are the most serious, leakage and fecal fistula. This study compared the surgical outcomes of trimming of perforation margin and primary closure after wedge excision of the perforation site.

METHODOLOGY

Between January 2021 and June 2022, this prospective observational study was carried out at 250 Bedded General Hospital, Naogaon & Clinic in Naogaon, Bangladesh. This study included 44 patients in total as study participants. According to how many patients there were, the total number of participants was split into two equal groups. 22 patients in Group I underwent wedge excision of the perforation site, and another 22 patients in Group II underwent trimming of perforation margin followed by a primary repair procedure. The entire intervention was carried out in accordance with the guidelines for human research outlined in the Helsinki Declaration [18] and in accordance with the laws in effect at the time as well as the General Data Protection Regulation's (GDPR) provisions [19]. Each case underwent a thorough physical examination, which included noting results from a digital rectal examination as well as findings related to anemia, jaundice, dehydration, edema, lymphadenopathy, nutritional status, pulse, blood pressure, abdominal signs like tenderness, muscle guarding, abdominal distension, liver dullness, and bowel sound. Hemoglobin, WBC total and differential counts, urine R/M/E, serum creatinine, blood urea, RBS, Widal test, plain X-ray of the abdomen in an upright position, including both domes of the diaphragm, and USG of whole abdomen were some of the tests performed on each case. After a history was taken, a general, abdominal, and radiographic examination revealed a suspicion of ileal perforation, resuscitation was carried out by IV fluid, electrolyte, and antibiotics because the majority of the patients were dehydrated & toxic. An NG tube was inserted for gastric suction in each of these patients. Patients had their hydration status improved, a Foley's catheter was used to catheterize them, their urine output was recorded and monitored, and their kidney function was assessed. Combination chemotherapy was applied. Each patient underwent an emergency laparotomy after cardiopulmonary resuscitation using a standard operating procedure, such as opening the abdomen with a midline incision while receiving general anesthesia. Primary closure was used after managing the conditions like peritoneal soiling, gut wall edema, number of perforations, distal obstruction, and adhesion after wedge excision of the perforation site. An experienced resident carried out the procedures. The tissue was removed circumferentially after the perforation's margin was trimmed until a secure primary repair margin was reached. In wedge (V) excision, a "V"-shaped wedge of tissue was removed, with the ante mesenteric border receiving 2 cm of ileal tissue from either margin and the mesenteric border at the tip. The main fix was made with a 3.0 Vicarly, single layer, interrupted suture. Complete peritoneal toileting took place and a drain was maintained. Following the procedure, the postoperative period was scrutinized for any complications, especially the development of any fecal fistulas or anastomotic leaking. Subjects were closely watched for both local and systemic problems if they developed fecal fistula or anastomotic leakage. At admission, each patient had a thorough history taken using a pre-designed study questionnaire. MS Office and SPSS version 2 programs were used to process, analyze, and disseminate all data in accordance with the requirements.

RESULT

For this study, a total of forty-four patients were chosen. Two groups made up of all the patients were created. Between two groups, the mean age difference was not statistically significant (p>0.05). Both groups of patients experienced similar levels of abdominal pain, H/O fever, abdominal distension, constipation, and vomiting. In groups I and II, post-operative fever was noted in 14 (63.5%) and 18 (81.8%) patients, respectively. The difference was statistically significant (p<0.05) in the chi square test. There were 13 cases of wound infection (59.1%) in group I and 18 cases (81.8%) in group II. Additionally, the chi square test indicated that the difference was statistically significant (p< 0.05). 6 (27.2%) in group I and 13 (59.1%) in group II showed anastomotic leakage. Additionally, the chi square test indicated that the difference was statistically significant (<p 0.05). One death was discovered in group I (4.5%) and 6 (27.3%) in group II, and the difference was statistically significant (p< 0.05) in the chi square test. The mean (±SD) length of hospital stays in groups I and II was 14.2 ± 7.2 days, ranging from 5 to 26 days, and 18.1 ± 8.9 days, ranging from 9 to 38 days respectively. In an unpaired "t" test, there was a statistically significant difference in the average length of hospital stays (p<0.05).

Table 1: Distribution of the respondents by age (N=44)

Age in Years	Group I (n=22)		Group II (n=22)		P Value
	n	%	n	%	
15-20	5	22.7	6	27.2	0.262^{NS}
21-30	10	45.5	11	50.0	
31-40	3	13.6	2	9.1	
41-50	1	4.5	2	9.1	
≥50	3	13.6	1	4.5	
Mean ± SD	32.1 ± 17.1		28.9 ± 11.8		
Range	15-67		15-55		

Table 2: Distribution on clinical presentation of ileal perforation (N=44)

Clinical presentation	Group I (n=22)		Group II (n=22)		P Value
	n	%	n	%	
Abdominal pain	22	100	22	100	0.230^{NS}
Fever	20	90.9	21	95.5	
Abdominal distension	17	77.3	15	68.1	
Constipation	14	63.6	13	59.1	
Vomiting	12	54.5	9	40.9	

Table 3: Post-operative fever of the study patients: (N=44)

Fever	Group I (n=22)		Group II (n=22)		P Value
	n	%	n	%	
Present	14	63.6	18	81.8	0.027^{S}
Absent	8	36.4	4	18.2	

Table-4: Wound infection of the study patients: (N=44)

Wound infection	Group I (n=22)		Group II (n=22)		P Value
	n	%	n	%	
Yes	13	59.1	18	81.8	0.006^{S}
No	9	40.9	4	18.2	

Table-5: Anastomotic leakage status of the study patients: (N=44)

Anastomotic leakage	Group I (n=22)		Group II (n=22)		P Value
	n	%	n	%	
Yes	6	27.2	13	59.1	0.002^{S}
No	16	72.7	9	40.9	

Table-6: Duration of hospital stay of the study patients: (N=44)

Traits	Group I (n=22)		Group II (n=22)		P Value
	Range	Mean ± SD	Range	Mean ± SD	
Hospital Stay (Days)	5-26	14.2 ± 7.2	9-38	18.1 ± 8.9	0.016S

Table-7: Distribution of mortality of the study patients: (N=44)

Mortality	Group I (n=22)		Group II (n=22)		P Value
	n	%	n	%	
Yes	1	4.5	6	27.3	0.017 S
No	21	95.5	16	72.7	

DISCUSSION

The objectives of this observational study were to: identify the underlying diseases confirmed by laboratory investigations, including histopathological examination of tissue from the lesions; compare the outcomes of wedge excision of the perforation site and trimming of the perforation margin followed by primary repair in the management of ileal perforations; and highlight the clinical features of frequently occurring ileal perforations. According to this study, the mean (±SD) age of those with ileal perforation in 44 patients was 32.1 ± 17.1 years, ranging from 15 to 67 years, and 28.9 ± 11.8 years, ranging from 15 to 55 years, for group I and group II, respectively. Most of the patients in both groups, according to research from [1, 9, 10, 11], were between the ages of 21 and 30. This suggests that patients with ileal perforation were more likely to be younger age groups [16,17] demonstrates that in developed nations, causes of perforation other than typhoid and tuberculosis include diverticulitis, lymphoma, amyloid, chemotherapy, radiotherapy, and idiopathic causes. As a result, typhoid fever and tuberculosis are the main causes of ileal perforation in developing nations. Both patient groups in the current investigation experienced abdominal pain. Group II had a 95.5% h/o fever rate compared to group I's 90.9% h/o fever rate. The percentages of abdominal distension in groups I and II were 77.3% and 68.1%, respectively. Constipation rates in groups I and II were 63.7% and 59.1%, respectively. Groups I and II had vomiting rates of 54.5% and 40.9%, respectively. Similar observations regarding the clinical presentation were made by [10, 12, 13]. The [10, 12, 13] series fever was present in 75%, 89.5%, and 80% of cases, respectively, supporting the current study. It was discovered that taking antipyretics and antibiotics while presenting could result in a drop in body temperature, as could going into septicemic shock. In this study, patients in group II experienced significantly ($p< 0.05$) higher post-operative fever. 81.8% of group II patients and 63.6% of group I patients both had post-operative fever. Wound infections affected 59.1% of those in group I and 81.8% of those in group II. Wound infection was significantly ($p< 0.05$) higher in group II. Anastomotic leakage in group II was significantly ($p< 0.05$) higher. [9, 10, 11, 14] found that the incidences of anastomotic leakage were 13.88%, 0.0%, 6.1%, and 0.0%, respectively. The type of surgical procedure does not appear to reduce the mortality associated with intestinal perforation, according to [1]. The group with ileostomies had the highest mortality (7/9), followed by the group with primary closure (2/7) and 4.5% in the group with wedge resection/resection anastomosis, according to the study by [15]. Although the overall morbidity was not significantly reduced in this series, the mortality was reduced with primary perforation repair after wedge excision of the perforated site. Through statistical analysis, it has been proven that wedge excision is less dangerous than trimming and primary repair.

Limitation of the Study:

This study had a single focal point and small sample sizes. Additionally, the study was completed in a very condensed amount of time. Therefore, it's possible that the study's findings don't accurately capture the overall situation in the nation.

CONCLUSION & RECOMMENDATION

This research demonstrated the need for a long-term study with a substantial sample size to assess the prevalence of ileal perforation in our country. A prospective study with a multicenter and sizable sample size should be conducted in order to evaluate the causes, early diagnostic and therapeutic approaches, and subsequently decrease mortality and morbidity. It has been demonstrated through statistical analysis that wedge excision is safer than trimming followed by primary repair.

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