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Original Research Article

A comparative study on outcome of ileal perforation after primary perforation closure and resection and ileostomy

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ABSTRACT

Background: Ileal perforations are a common occurrence in our hospital setup with a majority of cases having an etiology of typhoid. The presentation and management of ileal perforation with special reference to typhoid, nonspecific and traumatic perforations and the outcomes in these patients and the factors affecting prognosis are important. Aims and objectives of the study were to study the management of Ileal perforation. To compare the outcome of two different types of treatment for Ileal perforation i.e. Primary Closure (vs) Resection and Ileostomy.
Methods: This is a randomized comparative observational study conducted in general surgery department of Saveetha Medical College and Hospital, Chennai between February 2016 to October 2017. A Minimum of 28 patients was included in the study. Diagnosis was made on the basis of the X-ray erect abdomen, ultrasound abdomen, Widal test and intra-operative findings.
Results: The common age groups affected was 41-50 years age group (5 patients) and 61-70 years age groups (5 patients). The least affected were 1-10years age group (one patient). The incidence in males was slightly greater than females. Male to female ratio was 2.5:1. Typhoid perforation is the most common case of ileal perforation followed by non-specific perforation. Post-operative complications are more in the primary closure group with 32.14% (9 patients) which is lower when compared to ileostomy group 17.85% (5 patients). Complications of primary closure were wound infection (2 patients), burst abdomen (3 patients), faecal fistula (1 patient), respiratory complications (3 patients). Complications in ileostomy group were wound infection (4 patients) and respiratory complications (one patient).
Conclusions: Mortality was more in primary closure group with 21.42% (6 patients) and mortality was less in ileostomy group with 7.14% (2 patients). This study proposes that ileostomy may be given priority over other surgical options in moribund patients.

Keywords: Ileal perforation, Ileostomy, Resection, Typhoid perforation

INTRODUCTION

Ileal perforation is a common problem seen in tropical countries. Ileal perforation is due to many causes, the most common being Enteric fever, Tuberculosis. Trauma continues to be the most frequent reason for high morbidity and mortality.[1] Despite the availability of modern diagnostic facilities and advances in treatment regimens, this condition is still associated with a high mortality and unavoidable morbidity in tropical countries like India. Preoperative resuscitation, antibiotic therapy and total parental nutrition reduced mortality from 28.5% to 10%.[2] The various surgical options are drainage of peritoneal cavity done in moribund patients during

resuscitation and preparation for surgery, simple closure are done by freshening of the edges and closure.[3] Talwar et al recommended primary closure and limited surgery, wedge resection and closure in which a wedge of ileal tissue is resected around the perforation and the defect is closed transversely in two layers, resection- anastomosis done by excision of the affected segment and anastomosis has been recommended by some authors, ileotransverse colostomy is a simple closure, wedge resection or a resection anastomosis may be combined with a side-to-side ileotransverse colostomy, ileostomy is recommended by some authors.[5-9] Exteriorization of suture line, which prevents contamination of peritoneal cavity in case of leak. If fistulae form they invariably heal on conservative management.[5,10] Good peritoneal lavage and placement of drains to remove pus was recommended. Two-layer closure was recommended to decrease the risk of leakage.[9]

A midline or Para median incision was commonly used. Talwar et al recommended Rutherford Morrison incision in the presence of a confirmed preoperative diagnosis of perforation.[11] If there is fulminant sepsis in the abdominal cavity due to the formation of faecal fistula or any other cause laparostomy might be done. Laparostomy is defined as a laparotomy without reapproximation and suture closure of abdominal fascia and skin. The abdominal cavity is left open. It helps drainage of pus and prevents deleterious rise of intra-abdominal pressure. The wound can be closed after control of sepsis. The disadvantages are that the exposed intestine might perforate and formation of an incisional hernia. It may be combined with continuous postoperative peritoneal lavage.[11] Various complications of ileostomy include stoma necrosis, bowel obstruction, mucocutaneous separation, stoma stenosis, stoma prolapse, parastomal hernia, peri-ileostomy fistulas, peri-ileostomy skin problems. The present study was conducted in order to contribute the improvement in knowledge of this ileal perforation in its treatment and management because primary repair holds higher rate of complication when compared to resection and ileostomy. Hence this study was done to compare results of two different procedures used for management of ileal perforation i.e. primary repair (vs) resection and ileostomy.

Aims and objectives of the study were to study the management of Ileal perforation. To compare the outcome of two different types of treatment for Ileal perforation i.e. Primary Closure (vs) Resection and Ileostomy.

METHODS

Patients

This is a randomized comparative observational study conducted in general surgery department of Saveetha Medical College and Hospital, Chennai between February 2016 to October 2017. A Minimum of 28 patients was included in the study.

Inclusion criteria

- All cases irrespective of their age or sex presenting to surgical emergency with acute abdomen, proven to be a case of ileal perforation (due to any cause), on basis of operative finding only were included in the study.

Exclusion criteria

- Cases in which resection and anastomosis was done for ileal perforation are excluded from this study.
- Cases of peritonitis other than ileal perforation are excluded from the study.

The data was collected from the patients of all ages and both sex. Patients who underwent laporotomy and proven to be ileal perforation intraoperatively were observed and a detailed clinical history was taken for all these patients with an emphasis on the presenting complaints. All the cases of acute abdomen due to perforation confirmed by X-ray abdomen and ultrasound abdomen were initially taken for laparotomy and those cases with ileal perforation alone were included in the study and the rest were excluded. The data was entered into proforma which also includes the demographic data, therapeutic intervention, course in hospital and follow up. A thorough history and clinical examination was done for all patients, vital signs were recorded.

Routine pre-operative investigations like Hemoglobin, Random blood sugar, Total Leucocyte count, Bleeding time, Clotting time Blood Urea, Serum Creatinine, Widal test, Chest x-ray, Electrocardiogram, Ultrasound abdomen, X-ray Erect Abdomen were done for all patients. Prior to surgery, all the patients were resuscitated with correction of fluid and electrolyte balance had a nasogastric tube placed for decompression of gastric contents, and proton pump inhibitors. An informed consent was taken for surgical procedure and for the possibility of stoma. Patients were divided into two groups ileostomy group and primary closure group. Irrespective of the severity of the peritonitis, primary closure and ileostomy was done alternatively. Thorough peritoneal lavage was done in all patients before closure. All the patients were followed up closely for post-operative complications.

All data was tabulated, graphical analysis was made and subjected to statistical analysis in the form of ratios, percentages and non-parametric tests like Chi square test are used for `p` values.

RESULTS

The post-operative results showed the following as the different causes of perforations. Out of 28 ileal

perforations treated, 15 (53.57%) patients had typhoid perforation, 7 (4.76%) were nonspecific, 5 (17.85%) were traumatic, 1 (3.57%) was due to tuberculosis. The age ranged from 10 to 75 years. More number of patients was present between 41-50 years and 61-70 years. Out of these twenty-eight patients, 20 were males (71.42%) and females were 8 (28.57%). Male to female ratio was 2.5:1. More number of patients with ileal perforation was observed in February.

Frequency of symptoms

In this study of twenty-eight patients, fever was present by 16 patients (57.14%), vomiting was in 17 patients (60.71%), abdominal pain in 28 patients (100%), distension in 26 patients (92.85). All the patients in this study were presented with pain abdomen (Table 1).

Table 1: Frequency of symptoms.

Symptoms	No. of patients (N= 28)	%
Fever	16	57.14
Vomiting	17	60.71
Abdomen Pain	28	100.00
Distension	26	92.85

Duration of fever prior to perforation

Out of twenty-eight patients, one patient presented with one-day duration, nine patients with 2-3days duration, four patients had 4-5days duration, one patient had 6-7day duration and one patient had more than 8 days duration. Twelve (12) patients did not have any fever at the time of presentation. The interval between onset of pain abdomen and surgical intervention is one day to six days.

Clinical and radiological findings

Abdominal tenderness and guarding was seen in all 28 patients. Distension is present in 26 patients and bowel sounds were absent in 21 patients. Gas under diaphragm is present in 20 patients and free fluid in abdomen is present in 24 patients.

Number of perforations and distance of perforation from ileo cacal junction

In this study highest number of patients (23) was presented with single perforation, two perforations were observed in four patients and four perforations were seen in only one patient, more number of patients were having perforations, observed at 21 to 40cm from ileocaecal junction, followed by 0 to 20cm in 10 patients and lastly 41 to 60cm from ileocaecal junction in 6 patients.

Size of perforation

Size of perforation in 14 patients ranges from 0.6cm to 1cm, in ten patients size of perforation ranges up to 0.5cm and in four patients size of perforation is more than 1cm.

Surgical procedures

In total twenty-eight numbers of patients, fourteen patients had undergone primary closure and remaining fourteen patients underwent ileostomy.

Post-operative complications

In this study six patients were having wound infection, three patients were having burst abdomen, one patient was having faecal fistula and four patients were having respiratory complications (Table 2).

Table 2: Post-operative complications.

Post-operative complications	Incidence	Percentage
Wound infection	6	21.42
Burst Abdomen	3	10.71
Faecal Fistula	1	3.57
Respiratory Complications	4	14.28
Stoma Complications	0	0

As for wound infection was concerned two (2) were in primary closure group and four (4) were in ileostomy group. Of burst abdomen three (3) were in primary closure group and none were in ileostomy group. One patient had faecal fistula in primary closure group and none were in ileostomy group. Three (3) patients of primary closure had respiratory complications and one was in ileostomy group. Five patients of primary closure did not have any postoperative complications whereas nine patients of ileostomy group were without complications (Table 3).

Table 3: Postoperative complications in both primary closure patients and ileostomy patients.

Post-operative complications	Primary closure (n=14)	%	Ileostomy group (m=14)	%
Wound infection	2	7.14	4	14.28
Burst abdomen	3	10.71	0	0
Faecal fistula	1	3.57	0	0
Respiratory complications	3	10.71	1	3.57
Without complications	5	17.85	9	32.14

Chi-Square = 6.81, P-Value = 0.1

Mortality

In this study of twenty-eight patients total mortality was in 8 patients (28.57%) of which six belonged to primary

closure and two were from ileostomy.

Intraoperative procedures

The intraoperative procedure of Ileostomy for multiple perforation is patients were shown in the figures below.

Figure 1: Primary perforation closure.

The perforation on ileum and its primary closure is shown in Figure 1.

Figure 2: Multiple ileal perforations.

On examination of ileum multiple perforations was observed in many cases which is shown in Figure 2.

Figure 3: Ileostomy done for a patient.

Ileostomy procedure was done in a patient and the incision was sutured Figure 3.

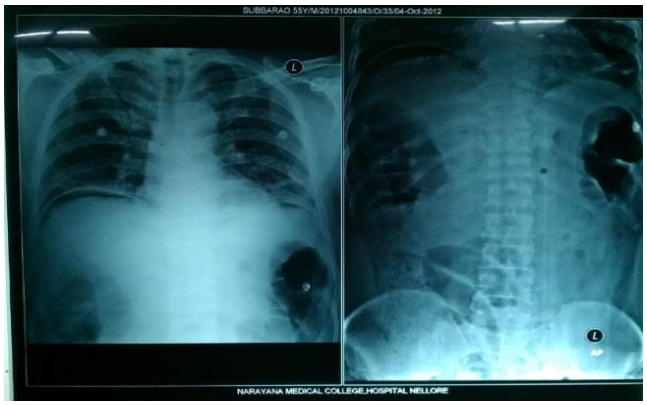

Figure 4: Chest X-ray and abdomen erect x-ray showing gas under right diaphragm.

The patient was subject to chest X-ray and abdomen erect X-ray which showed gas under right side of the diaphragm Figure 4.

DISCUSSION

Ileal perforation can be caused by many causes like trauma, tuberculosis etc. But typhoid fever is the most common cause of ileal perforation and its serious complications in the developing world that presents a challenge to surgeons. The perforation may lead to high morbidity and sometimes mortality if not treated in time.[12,13] The incidence of the disease varies considerably from one part of the world to another part of the world. The incidence of typhoid intestinal perforation had been reported as an indication of endemicity of typhoid fever in most of the localities.[12,14]

In this study group twenty-eight cases of ileal perforations due to different causes were operated. In those cases, typhoid intestinal perforation represented 53.5%. Onset of symptoms and time of presentation in the hospital are important prognostic factors. An early presentation holds a good prognosis. Unfortunately, in developing countries, the presentation to hospital is usually late with fully blown peritonitis, some cases may present with septicemia and multi-organ failure. Current literature strongly favors the surgical management only of enteric ileal perforation.[15,16] The age incidence is more in second decade. The perforation is common in 2nd and 3rd decade as evidenced by other studies.[17] The commonest cause of ileal perforation in this series was typhoid fever accounting for 53.5% of cases. The other causes of ileal perforation in this study are 25% nonspecific, 17.8% traumatic, 3.5% TB. Typhoid fever accounted for 56.6% of cases of ileal perforation in the series by Karmakar.[18]

When the etiology of the perforation was not identified it was termed non- specific perforation. Non-specific

perforation was the second commonest cause in this study accounting for 25% of cases. Five patients of non-specific perforation had fever prior to onset of abdominal symptoms (Table 1). Non-specific perforations were the commonest cause of small bowel perforation in the series by Dixon and Bhalerao.[19,20]

Trauma accounted for 17.8% of cases of ileal perforation in this series. 8.25% of ileal perforations published by Karmakar were due to trauma.[18] The rising rate of road traffic accidents and civil violence has contributed to this increased incidence of traumatic perforations. Tuberculosis accounted for 3.5% of cases of ileal perforations in the present study. Talwar et al., have found 19% of non-traumatic small bowel perforations due to intestinal TB.[21] Most patients presented with features suggestive of peritonitis. Patients of both typhoid and nonspecific perforations had similar presentation with respect to abdominal symptoms and signs. Patients with typhoid perforation had fever, abdominal pain and vomiting. Examination revealed tenderness, guarding, distension and intraperitoneal free fluid. Eggleston reported that most patients had fever, malaise and sudden increase in abdominal pain in typhoid perforation.[12]

There was a male preponderance with the male: female ratio in this study being 2.5:1. Total number of patients in this study are twenty-eight, of which twenty patients (71.4%) are males and female patients are eight (28.5%) in number. In agreement with other studies, ileal perforation in the present study was more common in males than in females.[22,23] The exact reason for this male preponderance is not known although it is possible that men have an increased risk of exposure to typhoid fever resulting from spending longer time and consuming more food outdoors that may lead to more frequent contact with the causative bacteria.

X-ray erect abdomen with both domes of diaphragm is a useful investigation to detect hollow viscus perforation. In our study free gas was seen under the diaphragm in 71.4% of perforations (Figure 4). In favor of this study, Pneumoperitoneum has been reported in 52% to 82% in studies done by Acheampong and Vaidyanathan.[24,25] The value of the radiological investigation has been compared with other writers and with current radiological techniques; 80-90% of cases are correctly diagnosed. Findings from our study demonstrated free gas under the diaphragm on abdominal and chest radiographs in more than seventy percent of cases which is consistent with other studies.[26,27] A plain abdominal or chest radiograph with free air under the diaphragm is a fairly frequent but variable finding significant hollow viscus perforation, but its absence does not exclude the diagnosis. Abdominal ultrasonography has also been found to be superior to plain radiographs in the diagnosis of free intra-peritoneal air as confirmed by the present study.[28]

Widal test was positive in 53.5% cases of this study. Widal was reported positive in 30% of patients with typhoid perforation by Kaul and in 46.1% of patients by Santillana.[5,8] It was reported positive in 75.5% of cases by Jarrett and in 73% by Vaidyanathan.[6,25] Four-fold increase in titres is considered more significant. In this study most, patients of confirmed typhoid were treated with ciprofloxacin and metronidazole. The rest had a third-generation cephalosporin (cefotaxime) and metronidazole.

One of the many factors affecting the surgical outcome in patients with intestinal perforation is time interval between duration of illness and surgical intervention (perforation-surgery interval).[29,30] Early surgery can minimize the complications while delayed surgery leads to severe peritonitis and septic shock. In the present study, the majority of patients were operated more than 24 hours after the onset of illness. Similar observation was reported by other studies done in developing countries.[30]

In the management of typhoid perforation some authors advocated conservative management.[31] Presently there is no such controversy in the treatment of typhoid perforation with the current recommendation being surgical management. The various methods in use are local drains, simple closure, closure with omental patch, wedge resection, resection and anastomosis, ileotransverse anastomosis and ileostomy.[6,8]

Orloff recommended debridement and closure in patients of traumatic perforation where the injury was small and resection anastomosis in patients with large wounds or multiple perforations. Patients with traumatic perforations had lesser complications presumably due to a healthier bowel than those patients with typhoid or non-specific perforations. In patients of traumatic perforations outcome in primarily influenced by injury to another organ.[32]

The presence of single intestinal perforation in majority (83.1%) of patients in this study is consistent with other reports.[33] The median age of the patients with single perforations in the present study was significantly higher than that of those with multiple perforations which is line with other reporters.[32, 33] The number of intestinal perforation in patients with typhoid ileal perforation has been reported to have an influence on prognosis.

In the present study, patients with multiple perforations had significantly high mortality rates compared to those with single perforations (Figure 2). Beniwal et al found that the number of perforation had effect on surgical outcome.[29] Adesunkanmi et al reported high incidence of residual abscess in patients with single perforation.[34]

In this study patients underwent primary perforation closure and ileostomy. Patients with multiple perforations underwent resection and ileostomy. The overall complication rate for all patients in this series was 50% (Table 3). In this study the common complications are

wound infection, burst abdomen, faecal fistula and respiratory complications. Wound infection is the commonest complication in this study (Table 2, 3), with a complication rate of 21.4% in six patients, Burst abdomen rates about 1 0.7%, faecal fistula rates about 3.5% and respiratory complications about 14.2%. Santillana in his series reported a rate of 71.9% in 96 patients.[5]

In agreement with other studies, wound infection was the most common postoperative complications in the present study.[12,13] High rate of wound infection in the present study may be attributed to contamination of the laparotomy wound during the surgical procedure. Primary closure was found to have a higher complication rate in this study, but this was not statistically significant. Ileostomy patients have less complication rate in this study. In contrary to this study Eggleston reported that the procedure done did not influence outcome.[35] Talwar and Sharma reported that mortality was least with early primary closure but in this study mortality was more in primary closure.[36] In cases of primary closure there are chances of leak into peritoneal cavity leading to peritoneal contamination which lead to re-laparotomy. As patient is already moribund, a re-laparotomy may lead to increased mortality. So, ileostomy is a better choice.

The mortality rate of 23.1% in the present study is comparable to the rates reported from tropical countries such as 22.0% from Nigeria where chloramphenicol is still the drug of first choice.[13] These figures are much higher than the rates reported from other tropical countries such as 6.8% from Nepal, and 10.5% from India in another study.[29]

A high mortality rate of 39.0% was also reported in Nigeria. Exceptionally low mortality rates of 1.5-2% have been reported from some parts of the developed world, where socioeconomic infrastructures are well developed.[37] The reasons for the high mortality are multifactorial. In this study high mortality rate was attributed to delayed presentation, inadequate antibiotic treatment prior to admission, multiple perforations, severe peritoneal contamination and presence of postoperative complications.

In this series the outcome of best results in terms of mortality, morbidity and post-operative complications were found to be in patients with ileostomy. The primary closure of perforation was associated with an overall 32% complication rate whereas only 17% in ileostomy group. Ileostomy proved to be the most successful procedure in this study in terms of overall mortality and morbidity, this is supported by Bhansali et al study, Kalid et al study, Meh et al.[38-40] There is, however a consensus that late presentation, delay in operation, multiple perforations, degree of faecal contamination of peritoneum and old age determine mortality and morbidity associated with this problem.

CONCLUSION

Post-operative complications and mortality is compared in between primary closure group and ileostomy group. Early surgery and adequate resuscitation are the important factors for successful management of patients with ileal perforation. This study proposes that ileostomy may be given priority over other surgical options especially in those moribund patients who present late in the course of their illness, have more than one perforation with massive faecal contamination of the abdominal cavity. Primary closure of perforation is a preferred technique in clinically stable patients with a single perforation with minimal soiling of the abdominal cavity.

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