

Original Research Article

Analysis of Outcome of Surgical Management in Ileal Perforation with and Without Ileostomy

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Abstract: Ileal perforation peritonitis is common surgical emergency in the Indian subcontinent, but the choice of procedure continues to be debated. Various strategies are being used to deal with ileal perforation. The aim of the study is to compare the results of two surgical modalities of treatment, as effective management of the disease to help in decreasing morbidity and mortality associated with disease. It is a prospective study from May 2013 –May 2015, involving 40 patients admitted from casualty and surgical OPD with diagnosis of ileal perforation peritonitis at Basaveshwara Teaching and General Hospital. Patients were divided into two equal groups. Patients in group 1 were managed by simple closure/ resection – anastomosis and in group 2 patients were managed by proximal defunctioning ileostomy to protect simple closure/ resection of the perforation. Severity of disease was assessed by using APACHE score. All patients were followed for post-operative complications. The most common cause of perforation was typhoid(45%), followed by non-specific (42.5%), tuberculosis(7.5%), traumatic(5%). Simple closure of perforation was done in 30% patients, resection – anastomosis was done in 20% and ileostomy proximal to simple closure/ resection-anastomosis was done in 50%. Postoperative complication rate in group 1 was 60% and 10% mortality. In group 2 complication rate was 85% and 20% mortality. Group2 patients had additive complication rate of 80% related to ileostomy. In patients with single perforation of upto 2cm with minimal contamination simple two layered closure of perforation is preferred. In patients with large perforations >2cm, multiple perforations, diseased unhealthy bowel, extensive peritoneal contamination, resection anastomosis is advocated instead of resection anastomosis with proximal temporary loop ileostomy due to its less morbidity related to ileostomy complications and need of second surgery for ileostomy closure.

Keywords: enteric fever, ileal perforation, peritonitis, loop ileostomy, resection-anastomosis

INTRODUCTION

Ileal perforation peritonitis is a common surgical emergency in the Indian subcontinent. It is reported to constitute the fifth common cause of abdominal emergencies due to high incidence of enteric fever and tuberculosis in these regions. Despite the availability of modern diagnostic facilities and advances in treatment regimens, this condition is still associated with a high morbidity and mortality.

Surgical approach is the standard treatment of ileal perforations and is the only successful modality, but the choice of procedure continues to be debated. Various strategies are being used to deal with ileal perforations including primary closure of perforation with or without omental patch, ileostomy, trimming of

ulcer edge and closure, wedge excision and anastomosis and segmental resection and anastomosis.

The proposed study aims to define the severity of peritonitis based on APACHE II (Acute Physiology and Chronic Health Evaluation) score, identify the cause, define the criteria for choosing a particular modality of treatment, and compare the short and long term outcome of the two surgical modalities of treatment.

The present study intends to establish the criteria for instituting the ideal management modality according to presentation and severity of disease and the outcome of these procedures. Effective management of the disease will help in decreasing morbidity and mortality associated with the disease.

AIMS AND OBJECTIVES OF RESEARCH

1. To compare the results of two surgical treatment modalities for ileal perforation
2. To assess the best treatment protocol in order to reduce the morbidity and mortality associated with the disease

MATERIALS AND METHODS

The proposed study was conducted in the Department of General Surgery, Basaveshwar Teaching and General Hospital attached to Mahadevappa Rampure Medical College Kalaburagi, from May 2013 – May 2015 on 40 patients admitted with a proven diagnosis of ileal perforation peritonitis.

Study design

This is a prospective study conducted on 40 patients who underwent laparotomy for ileal perforation between May-2013-May-2015. Patients were divided into two groups, selection of the patients for either of the group was done randomly.

Group I(n=20)[Primary closure]

Patients in this group were managed by simple closure / resection-anastomosis without defunctioning ileostomy.

Group II(n=20) [Ileostomy]

In these patients proximal defunctioning loop ileostomy was constructed to protect simple closure / resection of the perforation.

Inclusion Criteria

1. All cases of perforation peritonitis with strong suspicion of ileal perforation without prior diagnosis of any pathology.
2. Patients belonging to Group B according to APACHE II score

Exclusion Criteria

1. Previous diagnosis of intestinal tuberculosis
2. Children below 12 years.
3. Pregnant females

METHODOLOGY

All patients were subjected to:

- a. Detailed history
- b. Complete-general physical examination.
- c. Investigations – complete hemogram, total count, differential count, ESR, hematocrit, B. Urea, B. Creatinine, S. Electrolytes(Na^+ / k^+), Urine routine, Chest X-Ray, Erect-Abdomen X-Ray, ultrasound abdomen, Blood-Culture/sensitivity, Biopsy from the edge of perforation for histopathological examination.
- d. All patients had their APACHE II score recorded after admission

On the basis of history, physical examination and radiological investigation a provisional diagnosis of intestinal perforation was made. All patients were actively resuscitated before surgery and posted for exploratory laprotomy, intraoperative findings noted, biopsies from the edge of the perforation were taken in all before repair except in the traumatic cases and sent for histopathological examination. A thorough peritoneal lavage with 2-3 litres of normal saline was given before placing drains and closing the wound. Loop ileostomies were done in all patients belonging to group-2 by a standard technique in the right lower quadrant of the abdomen. All patients were followed for postoperative complications. The results were finally compared and concluded

Outcome was assessed by

- Duration of hospital stay
- Wound infection
- Wound Dehiscence
- Leakage\ Fecal fistula
- Intra-abdominal collection
- Ileostomy related complications (skin excoriation; fluid & electrolyte imbalance; retraction; stenosis)
- Reoperation

Statistical Analysis

For comparison of outcome between both groups Chi-Square test was applied as a test of significance. P value < 0.05 is considered as significant

APACHE II Scoring system (Acute Physiology And Chronic Health Evaluation)

The following acute physiological parameters of APACHE II score were assessed and recorded at the time of admission:

A. Physiological variables analyzed by APACHE II

- Temperature (degree Centigrade)
- Mean arterial pressure (mm Hg)
- Heart rate(/min)
- Respiratory Rate (/mm)
- pH
- PaO₂
- Sodium (mmol/L)
- Potassium (mmol/L)
- Creatinine (mg %)
- Haematocrit (%)
- White blood cell count (/cu mm)
- Glasgow Coma Scale (GCS) (15-actual GCS)

B. Age Points

- <44 years 0
- 45-54 years 2
- 55-64 years 3
- 65-74 years 5
- >75 years 6

C. Chronic Health Points[CHP]

- Non operative or emergency postoperative + 5 points
- Elective postoperative +2 points

APACHE II Score = Temp + MAP + HR + RR + paO₂ + pH + Na + K + Cr + HCT + WBC + (15-actual GCS) + Age points + CHP.

APACHE II Score = [a]+[b]+[c]

APACHE II scoring system divides patients into

- Group A : 0-9
- Group B : 10-19
- Group C : ≥20

Patients with APACHE II score between 10-19 (group-B) were subjected either for simple closure / resection-anastomosis or either of two with proximal loop ileostomy.

RESULTS

On the basis of criteria described, 40 patients were studied and evaluated and the following observations were made. The maximum ileal perforations occurred between second and third decade. Ileal perforation was common in male. Male: Female ratio was 4:1. The youngest patient was 13 years and oldest was 70 years with mean age 29.5 yrs.

Table 1: Clinical Presentation

Symptoms	Number of patients (%)
Pain abdomen	40 (100%)
Fever	32 (80%)
Abdominal distention	33 (82.5%)
Vomiting	29 (72.5%)
Trauma	2 (5%)

All 40 patients presented with pain abdomen (100%), which started in lower abdomen and later involving whole abdomen. The average duration of pain was 3.06 days. 80% of patients presented with fever, the average duration of fever were 7.6 days. In patients with enteric pathology, 18 out of 40, the duration of fever was 8.7 days ranging from 4 days to 25 days. Fever preceded abdominal symptoms in these patients. Vomiting was present in 72.5% patients. Abdominal distension was late feature present in 82.5%. Diarrhea was uncommon presentation present in only 1 patient.

Two patients (5%) had traumatic ileal perforation, both presented with history of blunt injury to abdomen.

Table 2: Duration of perforation

Duration (in hours)	Number of Patients (%)
<12	3(7.5%)
13-24	14(35%)
25-48	11(27.5%)
49-72	5(12.5%)
73-96	6(15%)
>96	1(2.5%)

Most of the patients (82.5%) presented within 72 hours of perforation and were operated within 12 hours of presentation after resuscitation. As the duration of perforation increased, the morbidity and mortality increased. 82.5% presented within 72 hours mortality in them was 6% and 17.5 % patients presented after 72 hours, mortality in them was 57%.

Table 3: Radiological Findings

A. Chest Radiograph	
Findings	Number of patients (%)
Pneumonia	3(7.5%)
Pleural effusion	2(5%)
Pneumonia +Effusion	2(5%)
Normal	33 (82.5%)

B. Abdomen radiograph

Findings	Number of Patients (%)
Pneumoperitoneum	32(80%)
Air fluid levels	6(15%)
Non specific	2(5%)

C. Ultrasound Abdomen

Findings	Number of Patients	
Collection of fluid in peritoneal cavity with internal echos	500ml	12
	1000ml	15
	>1000ml	9
Dilated bowels with absent peristalsis and minimal collection	4	

Chest & abdominal radiographs were done in all patients. About 82% patients had normal chest radiograph, whereas 17.5% patients had co-morbid pathology like pneumonitis (7.5%), pleural effusion (5%) & both in 5%.

Pneumoperitonuem was present in 32(80%) patients. In 6(15%) patients, abdominal radiograph were suggestive of intestinal obstruction and non-specific in 5%

Ultrasound abdomen was done in all patients preoperatively, 12 patients had collection upto 500ml,

15 patients had collection upto thousand 1000ml, 9 patients had >1000ml, 4 patients had dilated bowels with absent peristalsis and minimal collection.

Widal reaction

Widal test was performed in 38 cases. Antibody titre (TO/TH) greater than 1:160 were considered to be positive. Fourteen patients were positive for Widal reaction and in 4 patients where clinical findings and biopsy were suggestive of typhoid perforation, the test was considered as false negative. Rest of the patients with negative Widal test and inconclusive histopathology were considered as non-specific.

Peritoneal Fluid Culture

Peritoneal fluid culture was performed in 33 patients. E.coli was isolated in 19 patients (57.5%) followed by Klebsiella in 6 patients (18.1%), enterococcus in 2(6%), mixture of organism in 2(6%), and no growth in 4(12.1%).

Blood Culture

Blood culture was performed in 32 cases, which was positive for Salmonella typhi in 1 case. Rests of the cultures were sterile.

Table 4: Etiology of Perforation

Etiology	Number (%)
Typhoid	18(45%)
Tuberculosis*	3(7.5%)
Trauma	2(5%)
Nonspecific enteritis	17(42.5%)

* There was no evidence of tuberculosis in these patients before the surgery.

Typhoid fever accounted for 45% of ileal perforations. In 17(42.5%) patients investigations - widal reaction, blood culture, biopsy were inconclusive, hence placed in the 'nonspecific' group. Tuberculosis accounted for 7.5% of ileal perforations. Traumatic ileal perforation in 2 cases (5%) was as a result of blunt trauma abdomen.

Table-5 shows operative findings of all patients. 70% of the patients had single perforation , size less than 1 cm in diameter in 15%, upto 2cm in 67.5% and >2cm in 17.5%. 5 (12.5%) patients had multiple perforations.

25% of perforations were situated within 6 inches from ileocaecal junction. 37.5% of perforations situated within 7-12 inches. 30% within 13-14 inches and only 7.5% perforations situated beyond 24 inches.

Table 5: Operative Findings

Findings	Number (%)
Number of perforations	
1	28(70%)
2	7(17.5%)
≥2	5(12.5%)
Size of perforation (cm)	
<1cm	6(15%)
1-2cm	27(67.5%)
>2cm	7(17.5%)
Site of perforation (Inches from ileo-cecal junction)	
<6	10(25%)
7-12	15(37.5%)
13-24	12(30%)
>24	3(7.5%)

Distribution of Patients According to Etiology in Each Group

There were nine enteric perforation cases in each group and one tubercular perforation in group-1 and two in group-2, 1 traumatic perforation in each group, nine cases of nonspecific ileal perforation in group-1 and 8 in group-2.

In Group 1: simple closure of perforation was done in 12 patients with single perforation of upto 2 cm in size with minimal contamination and resection-anastomosis was done in 8 patients with large perforation (>2cm), multiple perforations(>2 in No.),extensive peritoneal contamination and unhealthy bowel.

In Group 2: 13 patients underwent simple closure of perforation with proximal loop ileostomy with single perforation upto 2 cm in size with minimal contamination and 7 patients underwent resection-anastomosis with proximal loop ileostomy with large perforation (>2cm), multiple perforations (>2 in No.),extensive peritoneal contamination and unhealthy bowel.

fistula other 2 were managed conservatively. None of the patients had leak in group-2 after ileostomy formation, 4(20%) patients in group-2 had leak after ileostomy closure, 2 of 4 patients needed reoperation for fecal fistula and other 2 were managed conservatively.

Intra-abdominal collection was seen in 10% in group-1 and 45% in group-2 after ileostomy formation and 20% in group-2 after ileostomy closure.

There were two deaths in group-1 due to renal failure & septicemia and 4 deaths in group-2 due to septicemia, MODS, renal failure and shock.

Ileostomy related complications

Peri-stomal skin excoriation was the predominant ileostomy related complication in 60% patients. Weight loss was observed in 40% cases. Two patients had persistent diarrhea accounting for fluid & electrolyte imbalance.

Complications after Ileostomy Closure

Four patients had leak following ileostomy closure, 2 underwent re-operations for fecal fistula and other 2 leaks were managed conservatively. 45% developed

wound infection, 15% wound dehiscence, 20% intraabdominal collection.

Systemic Complications

Chest infection was the common complication in both groups. Which included pneumonia in 15% of group-1 and 25% in group-2 after ileostomy formation (IF) / 15% after ileostomy closure(IC) in group-2. Pleural effusion seen in 10% of group-1 and 30 % of group-2. Other complications were sepsis, renal failure and shock.

Various surgical procedures and their outcome, mean apache score in each indicating severity of disease

In patients with simple closure in group-1 had complications of 25% and 0% mortality, 84% complication rate and 15.3% mortality in group-2 patients who underwent simple closure with proximal defunctioning loop ileostomy.

In patients with only resection-anastomosis in group-1 had complications of 75% and 25% mortality , 85% complication rate and 28.5% mortality was observed in group-2 patients who underwent resection-anastomosis with proximal defunctioning loop ileostomy.

Table 8: Morbidity and Mortality Pattern

	Group 1(n=20)	Group 2(n=20)		P
	Primary closure+RA	Ileostomy formation	Ileostomy closure	
Morbidity	12(60%)	17(85%)	16(80%)	<0.05
Mortality	2(10%)	4(20%)	-	NS

Group -1 patient had less morbidity compared to group 2. Two patients in group-1 & four patients in group-2 expired accounting for 10% & 20% mortality respectively. The overall mortality in our study was 15%.

DISCUSSION

Perforation peritonitis is common surgical emergency in India. The spectrum of etiology of perforation in Tropical countries is different from its Western counterpart. In contrast to the western literature, where lower gastrointestinal tract perforations predominate, upper gastrointestinal tract perforations constitute the majority of cases in Indian subcontinent [1]. Despite advances in surgical techniques, antimicrobial therapy and intensive care support, management of peritonitis continues to be highly demanding, difficult and complex.

The spectrum of etiology of perforation in India continues to be different and there is paucity of data from India regarding etiology, prognostic indicators, and morbidity and mortality patterns. The

postulated causes of ileal perforation include typhoid fever, tuberculosis, trauma, nonspecific enteritis, foreign bodies, Crohn’s disease, amoebiasis, malignancy, radiation enteritis. Perforation of the terminal ileum constitutes the fifth most common cause of abdominal emergencies in the tropical countries[2,3].

The micro-organism isolated from peritoneal fluid culture was E.coli(60.8%) followed by Klebsiella(17.3%). This signifies peritoneal contamination by gut organisms.

A recent retrospective study done in India shows perforations of the gastroduodenum are the most common cause of peritonitis. Generalized peritonitis due to perforation of the small bowel is seen more commonly in the developing countries, where it is usually secondary to perforation of typhoid ulcers are seen in enteric fever. Nonspecific or idiopathic ulcer perforation and tubercular ulcer perforations are the next common cause in most of the series[4].

The frequency of enteric perforation in typhoid fever reported variously from 0.8% to 18%[5]. An exhaustive study in India shows that enteric fever is responsible for nearly 87% of all nontraumatic small bowel perforations with mortality between 11% to 34%[3]. Patients of enteric perforation were admitted throughout the year with the highest in the months of August and September[2,6]. Perforation occurs classically on the antimesenteric border of the terminal ileum. In about 20 per cent of cases multiple perforation are present

A retrospective study by Jain B K *et al* involved analysis of 192 patients treated for non-traumatic perforation of small intestine; common cause of non-traumatic perforation of small intestine was typhoid (46.4%), followed by non-specific inflammation (39.2%), tuberculosis (12.8%) and malignant neoplasm (1.6%). Primary repair was the most frequent procedure (44.0%), followed by ileostomy (25.5%) and resection-anastomosis (19.3%). Superficial wound infection was common postoperative complication (46.8%), followed by wound dehiscence (31.3%). The wound infection rate was reduced by delayed primary closure of skin incision. Enterocutaneous fistula/leak developed in 11.5% patients. Salvage ileostomy for post-operative intestinal leak resulted in a better survival rate as compared to conservative treatment (85.7% vs. 50.0%). The overall mortality rate was 16.6%[7].

Various operative procedures are advocated by different authors, like simple closure, repair of perforation with ileo-transverse colostomy, ileostomy, exteriorization, single layer repair with an omental patch, trimming of ulcer edge & closure, wedge excision & anastomosis and segmental resection and anastomosis. Even with such a variety of procedures, enteric perforation still has a high rate of morbidity and mortality. The mortality ranges between 9% and 43%, with survivors having severe wound infection and a history of long hospital stays Morbidity from other post-operative complications ranges 8.8%- 71.3%[8].

It was found that those presenting within 24 hours of perforation had 25% mortality rate in comparison to those presenting after 96 hours who had a mortality rate of 83%[9]. Delay in operative intervention adversely affects the survival rate after surgery. Increasing the time interval between perforation and operation significantly increased the mortality (P <0.05)[10].

The management strategies for typhoid perforation of terminal ileum have included conservative and operative management. The modalities ranged from objectionable conservative approach to

present day laparoscopic surgical management of perforation peritonitis in enteric fever.

Considering anastomotic dehiscence, reperforation at new sites and mortality rate, segmental resection and end-to-end anastomosis gave the best result. Barring the hospital stay, segmental resection and end-to-end anastomosis appears to be the treatment of choice[11]. Athie *et al* recommended intestinal resection of 10 cm on each side of perforation and end to end ilealanastomosis[12].

In our study, typhoid(45%), tuberculosis (7.5%), trauma(5%) and nonspecific (42.5%) were noted. Wani *et al* reported enteric fever (62%), nonspecific (26%), obstruction (6%), tuberculosis(6%) and radiation enteritis(1%) in their study[13].

In our study 82.5% patients presented within 72hrs, had mortality 6% and 17.5% patients presented after 72hrs, and mortality was 57%. The majority of the perforations was single (70%), size 1-2 cm(70%), multiple perforations(15%) and located within 60 cm of terminal ileum(92.5%).

In this study, different operative procedures- only simple closure / resection-anastomosis in group 1 and simple closure / resection-anastomosis with proximal defunctioning loop ileostomy in group 2 were performed according to number, site & size of perforation, peritoneal contamination, bowel wall status & severity of illness.

In group-1: Simple closure of perforation was done in 12 patients with single perforation of size 2cm, with less peritoneal contamination, 2 of them developed wound infection & 1 developed wound dehiscence and leak. Resection-anastomosis was performed in 8 patients with multiple(>2No.) perforations, large perforation (>2 cm) or where segment of bowel appeared unhealthy and extensive contamination of peritoneum, the complication rate was 75% and 25% mortality . In the literature, simple closure of perforation is recommended for single perforations with less peritoneal contamination [3,5,7,9, 10,13,14] while wedge excision, segmental resection & anastomosis is recommended for multiple perforations, diseased segment of bowel[3,5,10,11,14]

In Group-2: Simple closure with proximal ileostomy was done in 13 patients with single perforation upto 2cm complication rate was 84% and mortality 15.3%. In 7 patients of group-2 who had multiple perforation(>2No.),large perforation(>2cm), unhealthy bowel, extensive contamination of peritoneal cavity segmental resection and anastomosis with proximal defunctioning loop ileostomy was performed,

morbidity and mortality rates were 85% & 28.5% respectively.

The morbidity rate from ileal typhoid perforation is high irrespective of the procedure. This is related to the virulence of the organism and extent of disease and not necessarily the surgical procedure[5]. Prognosis is directly related to the degree of septicemia which depends on the resistance of organism, degree of peritoneal contamination and delay in manifestation which is reflected in high APACHE II scores[8,15].

In our study the morbidity was higher(80%) in patients with ileostomy(group-2) as compared to 60% in patients with primary closure(group-1). The overall mortality was 15% which is low in comparison to other studies which reported 28%. Wound infection was the most common post-operative complication 45% in Group I and 70% in Group 2, followed by wound dehiscence, intra-abdominal collections and anastomotic leak which is in accordance with previous studies (p value <005)[8,13,15,16]. The other complications in Group 2 were related to ileostomy hampering quality of life and significantly added to morbidity in these patients.

Ileostomy related complications occurred in 12 patients(60%) and closure related complications occurred in 11 patients(55%). Ileostomy related complication rate in our study was higher than the previous studies[17-19]. Peri-stomal skin excoriation occurred in 60% patients and was the most frequently recognized early complication, followed by weight loss(40%), retraction(10%), prolapse(5%), and fluid& electrolyte imbalance(10%).

The average duration of hospital stay in group 1 was 13.6 days as compared to 34.5 days in group 2, including ileostomy closure. The average duration of ileostomy before closure was 99.4 days. The complications occurring after ileostomy closure were wound infection(45%), anastomotic leak(20%), intra-abdominal collections(20%), and wound dehiscence(15%).

Anastomotic leak was observed in 4 patients (20%) after ileostomy closure, two had reoperation and others were managed conservatively.

The average APACHE II score in group 1 was 13.6 and 14.6 in group 2, indicating that the average disease severity was almost same in both groups and outcomes are comparable. High APACHE II score has predicted prognosis and mortality in various studies [20-22]. APACHE II score predicted postoperative mortality was not confirmed in the study by Adesunkamni[8]. In our study, high score related to high morbidity as well.

Beniwal *et al* reported 49% cases presented within 48 hrs of perforation, 34% cases presented with 3-4 days old perforation, while 17% had more than 4 days old perforation with a mortality rate of 6.1%, 11.8% and 20.8% respectively. Simple closure of perforation is done for single perforation with less peritoneal contamination, while wedge resection, segmental resection and anastomosis for multiple perforation and diseased segment of bowel[6].

CONCLUSION

On analyzing the data, we found a definite difference in outcome between both groups of patients in study.

In patients with single perforation of size upto 2cm with minimal contamination simple 2 layered closure of perforation is preferable.

In patients with large perforation(>2cm), multiple perforation, diseased unhealthy bowel, extensive peritoneal contamination only resection-anastomosis is advocated instead of resection-anastomosis with proximal defunctioning loop ileostomy due to its less morbidity related to absence of ileostomy related complications and need of second surgery for ileostomy closure.

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