



## Study of morbidity and mortality after ileostomy in gangrenous small bowel perforations

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### Abstract

#### Aims & Objective

i) To study the morbidity status, complication and outcome of patients of small bowel perforations after ileostomy.

ii) To study the effectiveness of various ileostomy appliances in maintaining skin integrity after ileostomy.

iii) To study the intra operative findings determining the construction of type of ileostomy.

**Methods:** We conducted prospective observational study on 60 patients admitted in government hospital. Each patient of perforation, preoperative counselling and psychological preparation of the patients for stoma was done. After opening of abdomen, peritoneal lavage was done and exploration of the gut was done and intraoperative findings were recorded. Ileostomy appliance was applied in the post-operative period randomly in 30 patients each. Complications were divided into local and systemic. Follow up of patients was done at regular intervals. Local & systemic complication recorded and the management was done accordingly.

**Results:** i) Midline wound dehiscence and skin excoriation (58.8%) was the most common local complication. Parastomal hernia was seen in 3.3% patients. 23.3% patient presented with burst abdomen. ii) 76.6% patient shows skin excoriation in which Romson bag applied & 40% with Hollister bag iii) Electrolyte imbalance and pulmonary infection were the systemic complication seen in most of the patients. All the patients having septicaemia were expired. iv) 13.3% patients died inspite of all resuscitative measures.

**Conclusion** i) The increase in the perforation-operation interval increases the morbidity and mortality of the patients of ileal perforation ii) Skin excoriation was found to be much less in Hollister bag's application as compared to Romson's bag in ileostomy iii) There was a definite reduction in the mortality of the patients of small bowel perforation after ileostomy as compared to primary closure of perforations iv) However the morbidity rate following the ileostomy was not much affected but early diagnosis and meticulous surgical interventions of the cause of small bowel perforation and proper post op care is mandatory.

## Introduction

Peritonitis resulting from small bowel perforation is a frequently encountered surgical problem in the tropics. A review of literature indicates a very high mortality associated with this condition in spite of advances in treatment.

During the last century advances in antimicrobial therapy, operative techniques, early diagnosis and intensive care environments have produced a profound decrease in mortality from intra-abdominal infection. This improvement reached a plateau with severe intra-abdominal infections such as faecal peritonitis, diffuse suppurative peritonitis and necrotising pancreatitis. These entities do not respond to traditional therapies and continue to exhibit high mortality rates.

The high mortality rate in patients with ileal perforation appears to be a function of the disease process rather than the means of treatment. In favourable circumstances as in strictly localised lesions with a well known aetiology and otherwise normal bowel, a simple closure of perforation is warranted. In more advanced cases operated upon early, bowel resection and primary anastomosis is recommended to be the best method of treatment, though it yields poor results in seriously ill patients with most widespread peritonitis. In such patients it is advisable to protect the anastomosis by diverting the faecal stream by making a controlled fistula.

Each type of stoma is associated with a particular spectrum of complications, but some problems are common to all intestinal stomas. The specific ones are dealt under each category of stoma. A common complication, regardless of the stoma type, is destruction of the peristomal skin, which is usually caused by poor location or construction of the stoma. In addition to the acute maceration and inflammation of the skin, pseudoepitheliomatous hyperplasia may arise at the mucocutaneous border of stomas subjected to chronic malfitting appliances. One of the difficult complications to handle, especially in an obese patient, is improper location of the stoma, which prohibits maintenance of the seal of an appliance.

A special problem arises in the patient who has portal hypertension because the construction of a stoma results in the creation of a portsystemic shunt, and varices can form in the peristomal skin. Other common problems include the need for precautions with medications, especially time-released enteric medications, which may pass through a shortened intestinal tract unabsorbed. In some cases the ostomy patient has chronic difficulty maintaining proper fluid and electrolyte balance.

During my study interval, I prospectively reviewed a series of complications in 60 patients of small bowel perforations in which ileostomy was made.

## Aims and Objectives

- To study the morbidity status of patients of small bowel perforations undergoing ileostomy.
- To study the intra operative findings determining the construction of type of ileostomy.
- To study the effectiveness of various ileostomy appliances in maintaining skin integrity after ileostomy.
- To study the complications and outcome after ileostomy in patients of small bowel perforation.

## Material and Methods

After obtaining approval from ethical committee the present study entitled "Study of morbidity and mortality after ileostomy in gangrenous small bowel perforations" was conducted on 60 patients admitted in various surgery units at Department of General Surgery, J.A. Group of Hospitals and G.R. Medical College, Gwalior during period March 2017 to March 2018 after taking well and informed consent from the patient.

**Study Type:** Prospective descriptive study

**Inclusion criteria** i) All patients with diagnosed small bowel perforations whether traumatic, inflammatory, mechanical, iatrogenic or spontaneous in which ileostomy was made

ii)Gangrenous change in the segment involved

**Exclusion criteria** i) Patients with perforations of gastric, duodenal, large bowel and appendicular

ii) Post-operative patients who are lost in the follow up before closure of ileostomy

iii) Patients of ileal perforations and ileal obstruction not requiring construction of temporary ileostomy

iv) All patients unfit for general anaesthesia

### Methodology

This prospective study was carried out from 01.03.17 to 01.03.18. A written informed consent was taken from all patients. The age, gender, clinical signs and symptoms were recorded. Etiologically the patients were divided into typhoid, tuberculosis and trauma. Those patients who were diagnosed typhoid on clinical suspicion underwent Widal test. As per history recorded onset of acute pain is regarded as occurring of perforation. Each patient underwent erect abdominal x-ray examination.

As no enterostomal therapist is available in our set up, the preoperative counselling and psychological preparation of the patients for stoma was done by the operating surgeon.

After evaluation, the patient was taken in operation theatre and under suitable anaesthesia, abdomen was opened from midline. After opening of abdomen, peritoneal lavage was done and exploration of the gut was done and intraoperative findings were recorded. Then the type of ileostomy was decided as per the intra-operative findings.

A cruciate incision of about 2cm in diameter was given over skin. After splitting the rectus muscle, posterior rectus sheath and peritoneum was incised. The defect in the abdominal wall was dilated to admit tip of two fingers. A suitable section of ileum was chosen and delivered in defect of the abdominal wall.

The stoma was oriented so that the afferent limb was cephalad. Any sort of ileal rotation, mesentric fixation or tension on delivered section of small

bowel was avoided. The stoma of the small bowel was secured to the subcutaneous margin of the defect with 2-0 vicryl sutures. After this stoma was everted and sutured with the skin.

Ileostomy appliance was applied in the post-operative period randomly in 30 patients each.

Complications were divided into local and systemic.

Ileostomy was considered to be retracted when it was 0.5 cm or more below skin surface and required intervention. Prolapse was diagnosed if the stoma increased in size after maturation and required change of appliance or surgical treatment.

"Wound dehiscence" is said when there is premature "bursting" open of a wound along surgical suture. It is a surgical complication that results from poor wound healing

An electrolyte disorder is an imbalance of certain ionized salts (i.e., bicarbonate, calcium, chloride, magnesium, phosphate, potassium, and sodium) in the blood.

Skin excoriation is the act of abrading or wearing off the skin or a raw irritated lesion.

Septicaemia is the systemic illness with toxicity due to invasion of the bloodstream by virulent bacteria coming from a local seat of infection. Septicaemia treated with massive doses of antibiotics and is also known as blood poisoning.

Follow up of patients was done at regular intervals (i.e. within 15 days, 1 month, 3 months and 6 months and the management was done accordingly. In the patients in which there was prolapse or retraction of ileostomy was refashioned. In cases of obstruction and electrolyte imbalance the electrolyte replacement was done and in patients who were not relieved, re-exploration was done. In patients who had burst abdomen the tension suturing of the abdomen was done.

All the data was presented in the observation tables, analysed and interpretation was done. Suitable statistical test were applied for the significance.

**Table I** Table showing age distribution of patients

S.No.	Age (in yrs)	No.	%
1.	Less than 10	3	5
2.	10-20	12	20
3.	21-30	23	38.34
4.	31-40	12	20
5.	41-50	4	6.66
6.	More than 50	6	10
	Total	60	100

Table shows that in our series maximum number of perforations occurred in third decade of life. The youngest patient was 7 years old and oldest patient was 80 year old. Mean age is 29.75 years.

**Table II** Table showing sex distribution of patients

S.No.	Sex	No.	%
1.	Male	37	61.66
2.	Female	23	38.34
	Total	60	100

As evident from table II, the Male : Female ratio is 1.6:1.

**Table III** Table showing clinical symptoms of patients

S.No.	Symptoms	No.	%
1.	Pain in abdomen	60	100
2.	Vomiting	50	83.33
3.	Fever	46	76.66
4.	Diarrhoea	2	3.33
5.	Distention	52	86.66
6.	Constipation	50	83.33
7.	H/o Trauma	4	6.66

Abdominal pain was the most prominent symptoms and was found in all the 60 patients (100%).

Acute abdominal pain usually started just below umbilicus and later radiated downwards and laterally to cover the whole abdomen.

They were toxic, dehydrated with distended abdomen, tympanic to percussion and sensitive to touch.

Majority of them had a history of vomiting (83%), fever was seen in 46 patients (76.6%). In patients with enteric etiology, 30 out of 46 patients were having fever of average duration of 15 days.

Patients having tuberculous etiology had history of long duration of fever. Diarrhoea was

uncommon presentation as most of the patients were in paralytic ileus. Constipation and distension of abdomen was seen in 50 patients (86.6%) and 52 patients (83.3%) respectively.

**Table IV** Table showing clinical signs of patients

S.No.	Signs	No.	%
1.	Tachycardia (> 100/min)	52	86.66
2.	Hypotension (<100 mmHg systolic)	40	66.66
3.	Tachypnoea (>20/min)	28	46.66
4.	Urine output (<30 ml/hr)	6	10

As evident from table IV, tachycardia was the most common sign and was present in 52 patients (86.6%). Tachypnoea was present in 28 patients (66.6%) who had a long duration of perforation. Oligouria was present in only 6 patients (10%).

**Table V** Table showing distribution of cases as per Widal test

S.No.	Widal test(n=50)	No. of cases	%
1.	Positive	38	76
2.	Negative	12	24

Widal test was performed in 50 cases out of 60 patients who were diagnosed as typhoid perforation on basis of clinical suspicion.

As per the table 38 patients (76%) were positive for the test. 12 patients(24%) were Widal negative and they were considered non specific.

**Table VI** Table showing etiology of patients

S.No.	Etiology	No.	%
1.	Typhoid	38	63.33
2.	Tubercular	6	10
3.	Traumatic	4	6.67
4.	Non specific	12	20
	Total	60	100

Etiologically, typhoid accounts for 63.3% of all perforation cases followed by tuberculosis and traumatic perforation sharing 10% and 6% cases each respectively.

In 12 patients (20%) the etiology of the perforations were non-specific.

**Table VII** Table showing distribution of cases as per perforation-operation interval

S.No.	Duration	No. of cases	%
1.	Less than 12 hrs	4	6.66
2.	13-36 hr	14	23.33
3.	37-48 hrs	20	33.33
4.	49-72 hrs	6	10
5.	73-96 hrs	6	10
6.	More than 5 days	10	16.66
	Total	60	100

As evident from table VII, 44 patients (73.3%) were operated within 72 hours of perforation. Most of the patients (63.3%) presented to the hospital within 37 to 48 hours of perforation.

**Table VIII** Table showing x-ray findings of erect abdominal films

S.No.	X-ray findings	No. of cases	%
1.	Free gas under diaphragm	38	63.33
2.	Multiple air fluid level	14	23.33
3.	No significant finding	8	13.34
	Total	60	100

X-ray revealed pneumoperitoneum in 38 cases (63.3%) and multiple air fluid levels in 14 cases(23.3%).

Out of 60 patients, 8 patients (13.3%) showed no significant finding in erect abdominal X-ray films.

**Table IX** Table showing number of perforations intra-operatively

S.No.	No. of perforations	No. of cases	%
1.	One	31	51.66
2.	Two	14	23.33
3.	More than Two	15	25
	Total	60	100

Out of 60 cases, in which ileostomy was made, 31 patients (51.6%) had solitary ileal perforation and the numbers of perforation were two in 14 patients

**Table XII** Table showing type of ileostomy performed according to the intraoperative findings

S. No.	No. of perforation	Site of perforation	Operative procedure			
			Exteriorisation of perforation	Distal repair with proximal ileostomy	Double barrel ileostomy	End ileostomy
1.	One	A. <30cm.	Nil	13	Nil	1
		B. 30-60cm.	10	Nil	Nil	Nil
		C >60cm.	7	Nil	Nil	Nil
2.	Two	A. <30cm.	1	8	Nil	4
		B. 30-60cm.	Nil	Nil	Nil	Nil
		C >60cm.	2	Nil	Nil	Nil
3.	More than two	A. <30cm.	Nil	Nil	Nil	3
		B. 30-60cm.	Nil	1	7	1
		C >60cm.	Nil	Nil	1	1
	Total		20	22	8	10

(23.3%). More than two perforations were found in 15 patients (25%).

**Table X** Table showing distribution of patients according to site to perforation

S.No.	Site of perforation from ileo-caecal junction	No. of cases	%
1.	Less than 30 cm	29	48.33
2.	30-60 cm	20	33.33
3.	More than 60 cm	11	18.33
	Total	60	100

In 29 patients the perforation were located within 30cm. from ileocecal junction (48.3%). In 20 patients (33.3%), the perforation was located within 30-60 cm. from the ileocecal junction. In 11 patients (18.3%), the perforation was located more than 60cm. from the ileocecal junction.

**Table XI** Table showing distribution as per the operative procedure

S.No.	Operative procedure	No. of cases	%
1.	Exteriorisation of perforation	21	35
2.	Distal repair with proximal loop ileostomy	22	36.66
3.	Double barrel ileostomy	9	15
4.	End ileostomy	8	13.33
	Total	60	100

The repair of distal perforation with proximal loop ileostomy and exteriorization of solitary ileal perforation were commonly performed ileostomy, i.e. 21 (35%) and 22 (36.6%) respectively.

In 9 patients, resection of perforated ileal segment with double barrel ileostomy was performed. In patients where the perforations were multiple and near the ileocecal junction, distal stump closure with end ileostomy was performed i.e. 8 patients (13.3%).

Exteriorization of ileal perforation was performed commonly in patients who had solitary perforation with distance 30-60cms or more than 60cms from ileocaecal junction.

Repair of distal perforation with proximal loop ileostomy was performed in patients with one or two perforations with distance less than 30cms from the ileocaecal junction.

Resection of perforated ileal segment with double barrel ileostomy was performed commonly in patients with more than two perforations and distance

30-60cms or more than 60cms from ileocaecal junction.

End ileostomy was performed commonly in patients with two or more than two perforations and distance less than 30cms for the ileocaecal junction.

**Table XIII** Table showing type of ileostomy appliance used

S.No.	Ileostomy appliance	No. of cases	%
1.	Romson's bag	30	50
2.	Hollister's bag	30	50
	Total	60	100

During the post-operative period, out of 60 operated cases 30 cases are randomly selected for application of Romson's bag and 30 cases are selected for Hollister's bag.

**Table XIV** Table showing integrity of skin at the site of ileostomy appliance

S.No.	Type of appliance	Condition of skin	No.	%
1.	Romson's bag	Skin excoriation present	23	76.66
		Skin excoriation absent	7	23.33
		Total	30	100
2.	Hollister's bag	Skin excoriation present	12	40
		Skin excoriation absent	18	60
		Total	30	100

Skin excoriation was present in 35 patients (58.3%) out of 60. Out of 30 patient in whom the Romson's bag was applied, skin excoriation was present in 23 patients (76.6%). Out of 30 patients in whom the Hollister's bag was applied, only 12 patients (40%) had skin excoriation.

**Table XV** Table showing distribution of patients as per local postoperative complications

S.No.	Complication	No. of cases	%
1.	Bleeding	12	20
2.	Necrosis	4	6.66
3.	Stenosis	7	11.66
4.	Parastomal hernia	2	3.33
5.	Skin excoriation	34	56.66
6.	Retraction	9	15
7.	Prolapse	5	8.33
8.	Obstruction	14	23.33
9.	Midline wound dehiscence	32	53.33
10.	Burst abdomen	14	23.33

Midline wound dehiscence and skin excoriation were the most common local complication.

Parastomal hernia was seen in only 2 patients(3.3%).

14 patients(23.3%) out of 60, presented with burst abdomen.

**Table XVI** Table showing distribution of patients as per systemic postoperative complications

S.No.	Complication	No. of cases	%
1.	Electrolyte imbalance	32	53.33
2.	Pulmonary Infection	23	38.33
3.	Renal Failure	15	25
4.	Encephalopathy	14	23.33
5.	Septicemia	8	13.33

Electrolyte imbalance and pulmonary infection were the systemic complication seen in most of the patients.

Out of 60 patients, all the patients having septicaemia were expired. As per the collected data, rest of the complications were also associated with the expired cases.

**Table XVII** Table showing distribution as per the duration of stay

S.No.	Duration of stay	No. of cases	%
1.	0-15 days	15	23.33
2.	15 days - 1 month	36	61.66
3.	> 1 month	9	15
	Total	60	100

Duration of stay after the operation was less than 15 days in 15 patients (25%), 15days-1 month in 36 patients(61.6%) and more than 1 month stay in 9 patients(15%).

**Table XVIII** Table showing outcome of patient

S.No.	Outcome	No. of cases	%
1.	Recovered	52	86.66
2.	Died	8	13.33
	Total	60	100

Out of 60 patients, 52 were recovered and 8 patients died inspite of all resuscitative measures.

### Discussion

The present study consisted of 60 patients of surgically verified ileal perforation in which ileostomy was made, who were admitted in surgical ward in J.A. Group of Hospitals and Kamla Raja Hospitals, Gwalior (M.P.), during the period from 01.03.17 to 01.03.18.

**Table I** Table showing male predominance in ileal perforations

Study	Male predominance (%)
Mathur and Sharma	76.5%
Huttunen	72%
Present Study	61.6%

Small bowel perforation most commonly affect young men in the prime of life. The finding of male predominance in this series also agrees with report from Mathur and Sharma, Huttunen et al. Male accounts for 61.6% cases in present study. Only six patients having age more than 50 years. Typhoid perforation is rare under the age of 5 years and over the age of 50 years. The high percentage of cases amongst age group 20- 39 years in the present study is similar to that reported by Eggleston and Santoshi and Singh K.P. et al. However Eustache and Kreis have reported maximum incidence in age group 10-19 years.

**Table – II** Table showing Maximum incidence of typhoid perforation

Study	Maximum incidence of Typhoid Perforation
Olurin	1st Week
Khanna and Mishra	2nd Week
Bhansali	2nd Week
Present Study	3rd Week

Many text books stress that typhoid perforation usually occurs in the third week of fever while many report find that it occurs in first week

(Olurin). In this series the maximum incidence of typhoid perforation was seen in third week from 15<sup>th</sup>-30<sup>th</sup> day. Bhansali 1967 and Khanna and Mishrashowed that perforation occurred in second week. In present study maximum incidence was found in the third week. The reason for this was because of inadequate and symptomatic treatment by the registered medical practitioners and quacks which caused relief of symptoms initially but later on leads to the perforation and other complications in enteric fever.

Out of 60 patients, 50 were suspected to have typhoid ileal perforation. Widal test was performed in these patients and 38 patients who had antibody titre more than 1/80 were considered to have typhoid perforation.

In a study by Nadkarni et al the cause of perforation was difficult to establish in 18 of 32 cases (56.6%) and they were termed “non specific”. In their study cause played no role in the prognosis except for better results seen in traumatic perforation with healthy bowel. They concluded that the prognosis directly relates to the degree of septicaemia, which depends on the resistance of organism, degree of peritoneal contamination and delay in manifestation. Patients with advanced septicaemia usually die in spite of any treatment given. In the present study aetiology was considered to be nonspecific in 12 (20%), typhoid in 38 (63.3%), tuberculosis in 6 (10%) and traumatic in 4(6.6%). Traumatic bowel perforation had better prognosis than tubercular and typhoid perforations.

**Table – III** Table showing absence of free gas under diaphragm in perforation

Study	Absence of free gas under diaphragm (%)
Chapman	30%
Present Study	36.6%

X-ray abdomen erect/supine was performed in all cases. Absence of gas under the diaphragm does not rule out perforation peritonitis. This study proved this finding; 22 out of 60 (36.6%) did not show free air under diaphragm. Free air was present in 38 patients (63.3%). We agree with

Chapman et al, who showed pneumoperitoneum in 70% of cases.

In our study different types of ileostomy were performed. The common procedure performed were the exteriorization of the perforation and repair of distal perforation with proximal loop ileostomy.

The factors which affect the construction of type of ileostomy, were the site of perforation and number of perforations. In our study exteriorization of perforation was done in patients with solitary ileal perforation with distance 30-60cms. or more than 60cms. from ileocaecal junction.

The repair of distal perforation with proximal loop ileostomy was done in patients with one or two perforations and distance less than 30cms. from the ileocaecal junction.

Resection of perforated ileal segment with double barrel ileostomy was performed in patients with more than two perforations and distance of 30-60cms. or more than 60cms. from the ileocaecal junction.

End ileostomy was performed in cases with two or more than two perforations and distance less than 30cms. from the ileocaecal junction.

**Table IV** Table showing comparison of local complications of ileostomy

Study	A.P.K. leong (2005)	Present Study
Skin Excoriation	49%	56%
Midline Wound Dehiscence	48%	53%
Intestinal Obstruction	23%	23%
Retraction	17%	15%

There are many complications associated with ileostomy which add to the morbidity of the patients. In our study, skin excoriation and wound dehiscence were the most common complications. In accord with the study by A.P.K. Leong et al, the local complications were comparable as shown in table IV.

#### Ileostomy Appliances

Patients were managed with Romson's bag in 30 patients as it is cost effective as compared to Hollister's bag.

In our study, it was found that out of 30 patients in which Hollister's bag was applied skin excoriation was found to be present in 12 cases (40%) while 23 patients (76.6%) using Romson's bag had skin excoriation.

Pearson's Chi - square test was applied and the p value was found to be <0.05% i.e., highly significant.

Hence we recommend Hollister's bag as it reduces the incidence of skin excoriation around the stoma.

#### Systemic Complications:

As per our data, 10 patients were found to have increased perforation-operation interval i.e. more than 5 days out of which 8 patients died inspite of all essential resuscitative measures. Though all the patients who had septicemia expired, they also had other systemic complication which were also the contributing factors for mortality.

**Table V** Table showing mortality rates in various studies

Study	Mortality (%)
Orringer (1983)	28%
Singh K.P. (1991)	9.5%
Sachin Talwar (1997)	11.4%
Arshad Malik (2006)	1.85%
Present Study (2008-09)	13.3%

Mortality review of 19 patients of ileal perforation by Orringer et al was 28% vs. 13.3% in our study. This high mortality may be reflection of delay in operative intervention and the type of procedure performed. The mortality increased as the perforation-operation interval increased.

The study of Sachin Talwar reported mortality of 16.4% vs 13.3% in our study.

In study of Arshad M. Malik the overall mortality rate from primary closure was 12.5% and from ileostomy was only 1.85%.

In 1991, Singh K.P. and Singh K. study which was based on choice of surgical procedures in typhoid perforation, the mortality rate is 9.5% in ileostomy as compared to 14.4% overall.

We agree to the other authors in which mortality rates are comparable to our study i.e., 13.3%. Hence, the primary ileostomy is a better option in cases of ileal perforation.



In our study we got overall 13.3% mortality in ileal perforations treated by ileostomy, as compared with other studies who had shown a high mortality in their ileal perforations who were treated with primary closure. Therefore we recommend that early ileostomy reduces mortality.

### Conclusions

The present study concluded that:

- There is an increasing trend of performing stoma nowadays in emergency situations although being bothersome, ileostomy is still a live saving procedure.
- There was a definite reduction in the mortality of the patients of small bowel perforation after ileostomy as compared to primary closure of perforations
- The increase in the perforation-operation interval increases the morbidity and mortality of the patients of ileal perforation.
- It is of paramount importance that ileostomies are properly sited
- A loop ileostomy has an adverse effect on quality of life, which is further enhanced if stoma related complications occur.

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