

Original Research Article

Clinical study of typhoid ileal perforation and determination of preferred operative procedure in its management in Gandhi medical college and associated Hamidia hospital of Madhya Pradesh, India

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ABSTRACT

Background: To analyze clinical and operative findings in typhoid ileal perforation and determining preferred operative procedure.

Methods: All clinically suspected typhoid ileal perforation is classified into three categories depending on history, clinical and intraoperative findings (CAT I, CAT II, CAT III). All patients undergone surgical repair. Patient outcome in terms of complications, morbidity and mortality were compared to define the best procedure for Typhoid ileal perforation

Results: Out of 105 patients, majorities were less than 30 years and were males (4:1). Most common presentation being pain abdomen (100%), followed by fever (85.71%) while signs of peritonitis are present in all patients (100%) and majority patients had septicemia (77.14%) (TLC count >11,000 or <4,000) on presentation. 82 (78.09%) patients were Widal positive. Among CAT I (n=47), majority require primary repair (n=27; 57.44%) followed by resection anastomosis (n=14; 29.78%) and ileostomy (n=5; 10.63%) while among CAT II (n=38), majority require ileostomy (n=12; 31.57%) followed by resection anastomosis (n=5; 13.5%), whereas in CAT III (n=20), most patients require Ileostomy (n=14; 70%). Overall complications are more with CAT III (n=12; 60%) compared to CAT I (n=08; 17%) and CAT II (n=10; 26.31%) ($p<0.001$). Wound infection being most common complication (n=24; 22.85%), while fecal fistula more common with resection anastomosis (n=5; 21.73%) followed by primary repair (n=7; 14.89%). Mortality maximum with CAT III patients (n=6; 30%) ($p<0.05$). Stoma related complications mostly seen in CAT III. Among CAT II, two patients (5.2%) develop intra-abdominal abscess and two patients (5.2%) undergone stoma revision.

Conclusions: Primary repair and resection anastomosis are safer in CAT I while ileostomy is safer surgery in CAT III and CAT II. Resection anastomosis should be avoided in higher categories in fear of fecal fistula and related complications.

Keywords: Ileal perforation, Peritonitis, Typhoid

INTRODUCTION

Gastrointestinal perforations have been surgical problem since time immortal. Typhoid fever is endemic in India and other tropical Countries. Small intestine perforations

are the most common and dreadful surgical complication of enteric fever. In the past, enteric perforation was considered almost fatal as most surgeon up till 1960 remains with conservative management.¹ 1970 onwards most surgeons favoured surgical intervention in typhoid

perforation.^{1,2} Various operative procedure were advocated by different authors such as simple repair of perforation, repair of perforation with ileo-transverse colostomy, primary ileostomy, single layer repair with Omentum patch and resection and anastomosis, two layer closure and tube ileostomy.¹⁻⁵

Even with such a variety of procedure, enteric perforation still has a high rate of morbidity and mortality. The aim of the present study is to study the different clinical presentations and operative findings in typhoid ileal perforation, and to determine preferred operative procedure as per clinical and operative findings, in terms of complications, morbidity and mortality.

METHODS

A prospective study carried out in the Gandhi medical college and associated Hamidia hospital Bhopal, Madhya Pradesh, Indi from 2014 to 2017.

Inclusion criteria

All suspected typhoid ileal perforation- history of fever followed by acute onset of pain in abdomen, supplemented by signs of peritonitis, radiological finding of pneumo-peritoneum and/or Widal positive.

Exclusion criteria

- Any typhoid ileal perforation operated elsewhere and referred to us
- Any tubercular, traumatic, iatrogenic or malignant ileal perforation
- Patient already diagnosed some intestinal pathology or taking radiotherapy.

All suspected typhoid ileal perforation after initial resuscitation, have undergone laparotomy and are classified into three broad categories depending on history, clinical and intra operative findings. (CAT I, CAT II, CAT III).

CAT I

- Patient with short duration of history 1-2 days
- Vitals stable p<100/min, BP>90mmhg
- Minimal bowel contamination, single or multiple perforation with relatively healthy bowel
- Minimal Pyoperitoneum <500ml.

CAT II

- Patient with duration of history 3-5 days
- P >100/min but <120/min or Shock, BP <90 mmHg but recovered after resuscitation
- Single and multiple perforation with oedematous bowel
- Pyoperitoneum >500ml <1000ml.

CAT III

- Patient with duration of history >5 days
- P >120/min, feeble or non-palpable peripheral pulse
- Shock, BP<90 mmHg or not recordable and required vasopressor support
- Single or multiple perforation with oedematous, inflamed and fragile bowel
- Pyoperitoneum >1000ml.

All patients have undergone one of the four surgical procedures, either primary repair, or repair with omentopexy, or resection anastomosis, or ileostomy depending on intra-operative findings.

All patients post operatively receive same broad-spectrum antibiotics. Patient outcome in terms of complications, morbidity and mortality will be compared for procedure to procedure and category wise distribution to define the best procedure for Typhoid ileal perforation as per patient conditions and intra operative findings collaboratively.

RESULTS

Following observations were noted.

Table 1: Distribution by age and sex.

Age group (in years)	Total patients (n=105)	Male	Female
13-19	16 (15.2%)	10	6
20-29	24 (22.85%)	19	5
30-39	35 (33.33%)	30	5
40-49	17 (16.19%)	15	2
>50	13 (12.38%)	10	3
Total	105 (100%)	84 (80%)	21 (20%)

In this study, age ranges from 14 to 65 years, with maximum number of patients were young adults in their 2nd and 3rd decades (n=59; 56.19%). Also most of them happen to be males with M:F ratio being 4:1.

Table 2: Distribution of symptoms.

Symptoms	Number of patients (n=105)	Frequency percentage
Pain	105	100
Fever	98	93.33
Obstipation	65	61.90
Vomiting	48	48.71
Diarrhea	24	22.85

The commonest symptoms were abdominal pain (100%) and fever (93.33%). History of fever followed by sudden onset of pain in the abdomen found in 95 (90.47%) patients. Other common symptoms were of obstipation, vomiting and diarrhea.

Table 3: Distribution of signs.

Signs	Number of patients (n=105)	Frequency (%)
Tenderness	105	100
Guarding	105	100
Rigidity	105	100
Abdominal distension	74	70.47
Dehydration	70	66.66
Shock	58	55.23

Signs of peritonitis (tenderness, guarding and rigidity) were present in all patients (100%). Other common signs were of abdominal distention, dehydration and shock.

Table 4: Distribution of patients according to x-ray findings.

X-Ray findings	Number of patients (n=105)	Frequency (%)
Gas under diaphragm	96	91.42
Ground glass appearance	9	8.57

Table 5: Distribution of patients according to Widal test.

Widal test	Number of patients (n=105)	Frequency (%)
Positive	82	78.09
Negative	23	21.90

Total 96 (91.42%) patients present with gas under diaphragm in x ray scout abdomen. 9 (8.57%) patients with absent gas under diaphragm, USG supplement the diagnosis.

Total 82 (78.09%) patient shows Widal positivity while 23 (21.90%) patients were Widal negative and thus perforation was confirmed on USG. Also, patients have typical history of fever followed by abdominal pain, and intra-operative findings consistent with Typhoid ileal perforation. Total 98 (93.33%) patients had a history of fever in their course of illness. In most patients (n=47; 47.95%), perforation occurred in the second week of fever while in 36 patients (36.73%) perforation reported in the first week of illness.

Table 6: Time interval between onset of fever and perforation.

Time interval (days)	Number of patients (n=98)	Frequency (%)
1-7	36	36.73
8-14	47	47.95
15-21	10	10.20
22-28	4	4.08
>28	1	1.02
Total	98	93.33

Table 7: Intra-operative findings.

Intra-operative findings	Number of patients (n=98)	Frequency (%)
Feco-pyoperitoneum	105	100
No of perforation		
Single	85	80.95
Two	8	7.61
Three	7	6.66
>3	5	4.76
Site		
Within 2 feet proximal to ICJ	93	88.57
>2 feet proximal to ICJ	12	11.42

ICJ-ileo-cecal junction.

Table 8: Category, operative procedure and outcome.

Category (n=105)	Total patients	Primary repair	Primary repair with omentopexy	Resection anastomosis	Ileostomy	Overall complications	Mortality
CAT I	47 (44.76%)	27 (57.44%)	1 (2.12%)	14 (29.78%)	5 (10.63%)	n=8 (17.02%)	1 (2.12%)
CAT II	38 (36.19%)	18 (47.36%)	3 (7.89%)	5 (13.5%)	12 (31.57%)	n=10 (26.31%)	3 (7.89%)
CAT III	20 (19.04%)	2 (10%)	0	4 (20%)	14 (70%)	n=12 (60%)	6 (30%)
Total	105 (100%)	47 (44.76%)	4 (3.80%)	23 (21.90%)	31 (29.52%)	n=30 (28.57%)	10 (9.52%)

p<0.001.

- Intra-peritoneal feco-purulent fluid was found in all cases.
- Single perforation was found in 85 (80.95%) of the total cases, while 20 patients (19.05%) had multiple perforations.
- Amount of peritoneal contamination not only depends on number of perforation, but also on

interval of presentation, as seen in this study that some of the patients with single perforation but presented late (>5days), had gross peritoneal contamination (>1000ml)

- In about 93 patients (88.57%), perforation was found within 2 feet of terminal ileum while in the rest of the cases (n=12; 11.42%) it was more proximal.

Table 9: Category wise operative procedure and their complications.

Category wise complications	CAT I (n=47)				Overall complication and their frequency percentage in CAT I (n=47)
	Primary repair (n=27)	Primary repair with omentopexy (n=1)	Resection anastomosis (n=14)	Ileostomy (n=5)	
Wound infection	2 (7.40%)	-	3 (21.42%)	-	5 (10.63%)
Fecal fistula	4 (14.81%)	-	2 (14.28%)	-	6 (12.76%)
Wound dehiscence	-	-	1 (7.14%)	-	1 (2.12%)
Peristomal skin excoriation	-	-	-	1 (20%)	1 (2.12%)
Intra-abdominal abscess	-	-	-	-	-
Septicemia	1 (3.70%)	-	-	-	1 (2.12%)
Respiratory	-	-	-	1 (20%)	1 (2.12%)
Ileostomy retraction	-	-	-	-	-
Death	1 (3.70%)	-	-	-	1 (2.12%)

Table 10: Category wise operative procedure and their complications.

Category wise complication	CAT II (n=38)				Overall complication and their frequency percentage in CAT I (n=38)
	Primary repair (n=18)	Primary repair with omentopexy (n=3)	Resection anastomosis (n=5)	Ileostomy (n=12)	
Wound infection	3 (16.66%)	1 (33.33%)	2 (40%)	1 (8.33%)	7 (18.42%)
Fecal fistula	1 (5.55%)	-	2 (40%)	1 (8.33%)	4 (10.52%)
Wound dehiscence	-	-	1 (20%)	3 (25%)	4 (10.52%)
Peristomal skin excoriation	-	-	-	5 (41.6%)	5 (13.15%)
Intra-abdominal abscess	-	-	-	2 (16.66%)	2 (5.26%)
Septicemia	-	-	1 (20%)	2 (16.66%)	3 (7.89%)
Respiratory	-	-	-	2 (16.66%)	2 (5.26%)
Ileostomy retraction	-	-	-	2 (16.66%)	2 (5.26%)
Death	-	1 (33.33%)	1 (20%)	1 (8.33%)	3 (7.89%)

Table 11: Category wise operative procedure and their complications.

Category wise complications	CAT III (n=20)				Overall complication and their frequency percentage in CAT I (n=20)
	Primary repair (n=2)	Primary repair with omentopexy (n=0)	Resection anastomosis (n=4)	Ileostomy (n=14)	
Wound infection	2 (100%)	-	2 (50%)	8 (57.14%)	12 (60%)
Fecal fistula	2 (100%)	-	1 (25%)	-	3 (15%)
Wound dehiscence	1 (50%)	-	1 (25%)	1 (7.14%)	4 (20%)
Peristomal skin excoriation	-	-	-	2 (14.28%)	2 (10%)
Intra-abdominal abscess	-	-	-	-	-
Septicemia	1 (50%)	-	1 (25%)	4 (28.57%)	6 (30%)
Respiratory	-	-	-	-	-
Ileostomy retraction	-	-	-	-	-
Death	-	-	-	6 (42.85%)	6 (30%)

Most common complication in any category is wound infection, irrespective of type of procedure done. Wound infection is highest in CAT III, then in CAT II and CAT I (60% v/s 18.42% v/s 10.63% respectively); ($p < 0.01$), due to patients poor condition and septicemia.

Fecal fistula is almost same in CAT I and CAT II and slightly higher in CAT III, mostly in patients with repair leak in primary repair and RA (12.63% versus 10.52% versus 15% respectively). Fecal fistula is a very sinister complication as it increases the morbidity and mortality.

Development of fecal fistula was only seen with primary repair and resection anastomosis patients. Wound dehiscence again highest in CAT III (20%) due to septicemia and poor general condition of patients. Skin excoriation is higher in CAT II (13.15%) than in other categories (CAT I - 2.12%; CAT III - 10%). Septicemia being highest in CAT III (60%).

In CAT I wound infection is more common in RA than primary repair (21.42%, 7.40%) while frequency percentage of fecal fistula is same in both primary repair and RA (14.81%, 14.28%). In CAT II, wound infection is more common in RA than repair with Omentopexy followed by primary repair and ileostomy (40% versus 33.3% versus 16.66% versus 8.33% respectively). Fecal fistula is more common in RA than Ileostomy and primary repair (40%; 8.33%; 5.55% respectively) while wound dehiscence more in ileostomy than RA (25% v/s 20%). In CAT III, wound infection is more common with primary repair (100%), v/s ileostomy (57.14%), and RA (50%). Fecal fistula develops in all patients undergone

primary repair (n=2; 100%) versus RA (n=1; 25%), while no fecal fistula noted in ileostomy and omentopexy patients. Highest rate of septicemia seen in CAT III (30%), that too more common in patients with primary repair and ileostomy.

Table 12: Overall distribution of postoperative complication.

Overall complication (n=105)	Frequency (No. of patients)	Percentage
Wound infection	24	22.85
Fecal fistula	11	10.47
Dehiscence	7	6.66
Excoriation	6	5.71
Septicemia	4	3.80
Respiratory complication	3	2.85
Abscess	2	1.90
Ileostomy retraction	2	1.90
Mortality	10	9.52

Table 13: Category wise procedure and hospital stay.

Category	Procedure	No. of patients	Average hospital stay procedure wise (days)	Average hospital stay category wise (days)
CAT I	Primary repair	27	8.40	9.78
	Repair with omentopexy	1	7	
	RA	14	12.45	
	Ileostomy	5	11.28	
CAT II	Primary repair	18	9.1	12.89
	Repair with omentopexy	3	13.66	
	RA	5	15.6	
	Ileostomy	12	13.23	
CAT III	Primary repair	2	14.50	15.12
	Repair with omentopexy	0	-	
	RA	4	17.59	
	Ileostomy	14	13.27	

P<0.05

Overall Mortality is more in CAT III patients (30%) compared with CAT II (7.89%) and CAT I (2.12%) due to septicemia and deranged vitals in most patients of CAT III. Overall most common complication seen is wound infection (n=24; 22.85%), followed by fecal fistula (n=11; 10.47%) and wound dehiscence (n=7; 6.66%).

Overall Mortality is seen in 10 patients (9.52%). The mean hospital stay was more in CAT III (15.12 days) than CAT II (12.89 days) and CAT I (9.78 days). This might be due to late presentation, deranged vitals as most patients require vasopressor support, and high contamination (Feco-pyoperitoneum >1000ml) results in more septicemia and more overall complications in CAT III patients.

Table 14: Procedure and hospital stay.

Procedure	Average hospital stays (days)
Primary repair	10.66
Repair with omentopexy	10.33
Resection anastomosis	15.21
Ileostomy	12.59

P<0.05

Average hospital stay for patients was longer in resection anastomosis (15.21days) than ileostomy (12.59days) while almost similar in primary repair and repair with omentopexy (10.66 versus 10.33days). Longer hospital stay in RA is due to more fecal fistula and related complications in RA.

Table 15: Mortality in relation to duration of perforation.

Duration of perforation (day)	No. of cases	Mortality	Frequency percentage
1-2	48	2	4.16
3-5	39	3	7.69
>5	18	5	27.77

P<0.05

Maximum number of patients presented within 48 hours of perforation, and has less mortality. Percentage of mortality significantly goes on increasing when patients presented late (>5 days), due to increased septicemic complications.

DISCUSSION

Age

Typhoid perforation is common in the 2nd and 3rd decades of life.^{3,4,7,9} The high percentage of cases (33.33%) amongst the age group of 30-39 years in the present series followed by 20-29 years (22.85%). The perforation is most common in the 2nd and 3rd decades.⁶⁻⁹

Sex

Typhoid perforation is more common in males than in females.^{3,4,6,7} In the present series M:F (Male-female ratio) ratio was 4:1, that is consistent with the ratio of 3.8:1 reported, 5.25:1 reported and 4:1 reported.¹⁰⁻¹² This is due to the fact that males possibly have more exposure for infection.

WBC count

In our study of typhoid perforation, leucocytosis (WBC>11000/cu.mm) was present in the majority (60.95%) of cases due to septicemia in most of the patients and leukopenia (WBC<4000/cu.mm) was present in the 16.1% of cases, might be due to bone marrow depression by enteric toxemia. The same was reported.¹³ (64% and 12% respectively).

Signs and symptoms

Abdominal pain, fever and signs of peritonitis were most frequent symptoms and signs in this study, as also shown in various studies.^{4,6,7,11,13-17}

Radiology

Gas under diaphragm in x-ray abdomen standing is an important finding in any intestinal perforation and helpful in diagnosis. Our study demonstrated free gas under the diaphragm in more than ninety percent (91.42%) of cases which is consistent with other studies.^{18,19} Free gas under the diaphragm on x-ray film readily clinches the

diagnosis, but its absence does not exclude the diagnosis if peritoneal signs are present. A study shows that abdominal USG was superior to plain radiographs in the diagnosis of free intra-peritoneal air.²⁰ (As we also use USG to confirm our diagnosis in some patients where there is no free gas seen on plain radiographs).

Widal status

Different studies show different frequency of widal positivity. Widal test shown positive in 46.1% of patients with typhoid perforation 30% by and 88% of cases.²¹⁻²³ In our study widal is positive in 78.09% of cases.

Time interval of perforation

Typhoid perforation usually occurs in the second and third week of fever. In our study, the maximum incidence of perforation was in the second week of fever (47.95%) followed by those in the first week (36.73%). Studies reported that majority of perforations occurred in the first week of fever. reported 33% incidence in the second week of fever.^{6,9,16,24} Our findings are nearly similar to those studies. Our study shows that patients who perforate during the 1st two weeks of the illness appear to have a better prognosis.¹⁸

Intraperitoneal contamination

Feco-pyoperitoneum was found in all cases. Single perforation was found in 80.95% of the total cases while in 19.05% of cases there was more than one perforation. Although Feco-pyoperitoneum in 100% of cases, the amount of contamination also depends on duration of presentations as seen in this study. Various other studies also show same findings, single perforation found in 81.5% cases and multiple perforations in 18.5% cases.²⁵

Location of perforation

In about 88.57% of the cases perforation was found within 2 feet of terminal ileum while in the rest of the cases (11.42%) it was more proximal. It was reported as 87% and 13% almost same as our study.²⁵

Postoperative complication

Overall complication rate for all patients in this study was 28.57%. Typhoid perforations are associated with a high morbidity rate with literature reports between 24.5% and 81%. It was reported overall complication rate of 51.6%.²¹

Overall most common complication seen is wound infection (22.85%), followed by fecal fistula (10.47%) and wound dehiscence (6.66%).

Wound infection was highest in CAT III, then CAT II and CAT I (60% versus 18.42% versus 10.63% respectively) due to patients poor condition, more

contamination (fecopyoperitoneum>1000ml) and septicemia and in CAT III. Fecal fistula is almost same in CAT I and CAT II and slightly higher in CAT III, mostly in patients with repair leak in primary repair and RA (12.63% versus 10.52% versus 15% respectively).

In the present study, fecal fistula developed in 10.47% patients, which was almost similar to as reported by 16.6%, 10% and 8% by.^{9,18,26}

Wound dehiscence present in 6.66% of total patients, which was almost similar to various other studies (4-10%).^{9,19,26} Overall mortality is seen in 9.52% patients in this study, which was significantly low as compared with various other studies as, 48%,14.6% and 28% by while others reported no mortality in patients of enteric perforation treated with temporary Ileostomy.^{4,8,12,14,24}

It was reported 21.47% mortality with resection anastomosis v/s very low, 4.34% in our study.²⁷ This is because most patients develop fecal fistula, underwent stoma creation as a lifesaving procedure, thus avoiding mortality. Although like other studies, most common procedure related to mortality in present study is also resection anastomosis and the factors significantly affecting mortality were to the duration of perforation (>5 days), deranged vitals, more septicemic load with more contamination (fecopyoperitoneum >1000ml).

Postoperative stay

The average hospital stay was highest in CAT III (15.12days) than CAT II (12.89days) and CAT I (9.78days) due to high rate of complication in CAT III. The average hospital stay of the patients was slightly longer in case of ileostomy (16.5 days) in comparison with other procedures (15 days).²⁶ In present study, average hospital stay of the patients was longer in Resection anastomosis (15.21days) than Ileostomy (12.59days) again due to its complication related to formation of fecal fistula.

CONCLUSION

A wide variety of operative procedures are tried in typhoid enteric perforation, but all have high morbidity and mortality. Development of fecal fistula due to re-perforation or perforation from another ulcer, duration of perforation, number of perforation, intra-operative findings and patient poor condition is a significant factor affecting morbidity and mortality, and every effort should be made to avoid this.

Repair of perforation and RA should be the initial choice of treatment in typhoid enteric perforation in CAT I, because this is a simple, quick, with lowest complication rates and cost-effective. In CAT II, ileostomy should be preferred due to less complication, early discharge and lifesaving procedure. Resection anastomosis is less preferred procedure and should be avoided due to its

higher complication rate, more chances of fecal fistula formation, which overall increases the hospital stay, morbidity and mortality. Ileostomy is lifesaving procedure and should be procedure of choice in CAT III patients. Despite this, complication rates are higher in CAT III, this shows high septicemic load and debilitating condition of the patient in CAT III.

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