

# A Clinical Profile of Typhoid Perforation of Bowel in a Tertiary Care Centre

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## Abstract

**Background and Aims:** Salmonella typhi causes an estimated 22 million cases of typhoid fever and 216000 deaths annually worldwide<sup>1</sup> and in developing countries, typhoid bowel perforation is an important surgical problem. The surgeon is faced with number of challenges during the management of these patients. The aims of this study are 1. To study the clinical profile of typhoid perforation of bowel in a tertiary care centre. 2. To study post operative outcome in patients with typhoid ulcer perforation. **Methods and Methodology:** A total of 45 patients diagnosed as having typhoid bowel perforation were included for the study after fulfilling the inclusion/ exclusion criteria. **Results:** Majority of patients were in the 2<sup>nd</sup> and 3<sup>rd</sup> decades (57.7%) with age ranging from 18 to 68 years. There were 28 (63.63%) males and 17 (37.7%) females. Fever with abdominal pain were the symptoms in all subjects followed by vomiting, distension of abdomen and constipation respectively. Most of the patients presented during 2<sup>nd</sup> and 3<sup>rd</sup> week of illness. 5 patients presented early i.e. within 24 hours and 40 patients presented late i.e., after 24 hours. Widal test was positive in 35 (79.45%) cases. Majority of patients (66.6%) group showed leucocytosis, while 7% showed leucopenia and 17% had normal WBC counts. Single perforation was found in 27 patients (60%), 2 perforations in 14 patients (31.1%) and more than 2 perforations were found in 4 patients (8.8%). Gas under diaphragm was present in all the patients. The most commonly done procedure in 33 cases (73.33%) was simple closure of the perforation and resection and end to end ileo ileal anastomosis was done in 10 patients whereas ileo transverse anastomosis with ileostomy was done in 2 patients with multiple perforations. The most common post-operative complication was surgical site infection followed by respiratory infections, wound dehiscence. Enterocutaneous fistula was present in one case Mortality rate of 6.6% was seen.

**Keywords:** Typhoid, Perforation

## 1. Introduction

Typhoid fever, a febrile illness caused by *Salmonella typhi*, a gram negative bacillus is transmitted by faeco-oral route. It is characterized by fever, weakness, malaise, headache, pain in abdomen and other gastrointestinal symptoms and an epidemic can occur in areas where clean drinking water is unavailable<sup>2</sup>. Treatment of uncomplicated typhoid ileitis is accomplished by antibiotic administration. Complications include haemorrhage and perforation. Rate of perforation is between 0.8% and 18%<sup>3</sup>. It presents with history of fever, abdominal pain associated with

tenderness, rigidity or guarding. In majority of cases, patients' present very late, generalized purulent/faecal peritonitis with septicaemia is already developed.

The burden of the disease falls more on developing countries with high mortality and morbidity due to poor standards of living, poor hygiene and sanitation<sup>4</sup>, unavailability of drinking water. The patient presents late which leads to delay in diagnosis. Also there is emergence of virulent bacteria resistant to many drugs<sup>5</sup>.

The treatment of choice is surgery. The various surgical procedures done in the treatment of enteric perforation are: primary closure, segmental resection and closure,

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resection of the affected terminal ileum and end-to-end anastomosis, loop or end-ileostomy, resection with ileo transverse anastomosis, and resection with right hemicolectomy<sup>6</sup>.

A detailed history, clinical examination, radiological and biochemical investigations help to arrive at a correct preoperative diagnosis. Therefore, the study of this problem is needed, especially in India, where there is high prevalence of the disease.

The purpose of this study is to share the experiences at our institute on surgical management of typhoid intestinal perforation, treatment outcome and to determine the prognostic factors for morbidity and mortality.

## 2. Materials and Methods

Our study included 45 patients, admitted at tertiary health care centre during the period of December 2013 to December 2015. Study included all patients more than 18 years of age diagnosed cases of typhoid ulcer perforation irrespective of sex. Perforation due to other causes like Malignancy, Obstruction, Trauma, perforation of oesophagus, biliary tree, female reproductive tract, stomach, duodenum, large intestine, appendix and associated medical illness e.g., cardiac, respiratory illness and with pregnancy were excluded from the study.

The diagnosis was made on history, clinical examination, laboratory investigations, identification of free air under the diaphragm on erect abdominal and chest radiographs and intra operative findings of perforation on antimesenteric border of ileum. Pre-operative resuscitation was done by intravenous fluids, Ryles tube insertion and aspiration, Foleys catheterisation, urine output charting, blood pressure and CVP monitoring, Correction of anaemia, serum electrolytes level, blood urea and serum creatinine, dehydration, shock and administration of broad spectrum antibiotics.

Exploratory laparotomy was done with appropriate skin incisions (midline, right paramedian) Operative findings were noted including number of perforations, the amount of pus and fecal contamination. The edge of the ileal perforation was excised and closed transversely in two layers, resection anastomosis with or without ileostomy in selected cases. The variables studied in the post operative period were complications, mortality and hospital stay.

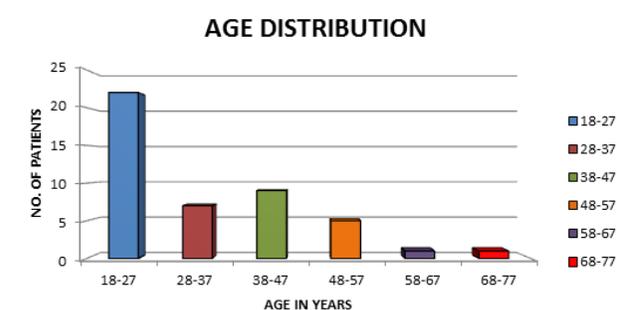
## 3. Observations and Results

A Clinical study of 45 cases of typhoid ileal perforation was

done during the period of December 2013 to December 2015 at a tertiary care centre. Patients underwent surgery for typhoid ileal perforation during the study period.

**Table 1.** Age distribution of patients

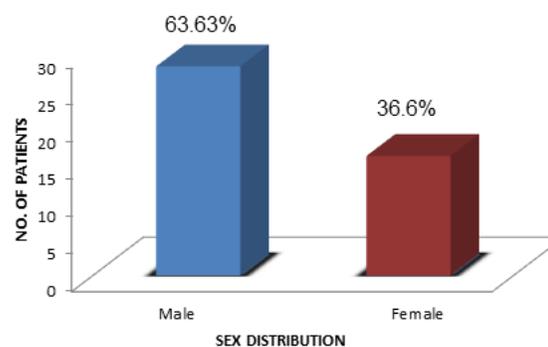
Age in Years	No. of Patients	Percentage (%)
18-27	22	48.8
28-37	07	15.5
38-47	09	20
48-57	05	11.1
58-67	01	2.2
68-77	01	2.2
<b>Total</b>	<b>45</b>	<b>100</b>



Majority of patients (57.7%) were in the 2nd and 3rd decades with age ranging from 18 to 68 years. The youngest was 18 years old and oldest was 68 years.

**Table 2.** Sex distribution

Sex	No. of Patients	Percentage (%)
Male	28	63.63
Female	17	37.76



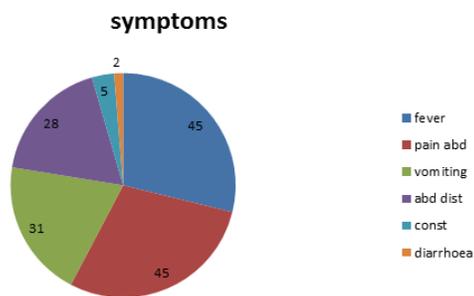
The study included 28 (63.63%) males and 17 (37.7%) females.

### 3.1 Symptoms and Signs

Fever with abdominal pain were the symptoms in all subjects followed by vomiting, distension of abdomen and constipation respectively.

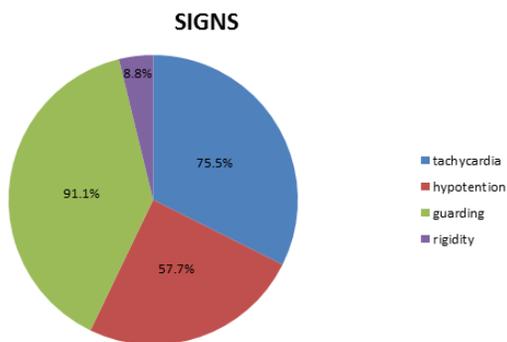
**Table 3.** Symptoms

Symptoms	No. of Patients	Percentage(%)
Fever	45	100
Pain in abdomen	45	100
Vomiting	31	66.6
Distention of abdomen	28	62.2
Constipation	05	11.1
Diarrhoea	02	4.44



**Table 4.** Signs

Signs	No. of Patients	Percentage (%)
Tachycardia	34	75.5
Hypotension	26	57.7
Guarding	41	91.1
Rigidity	04	8.88



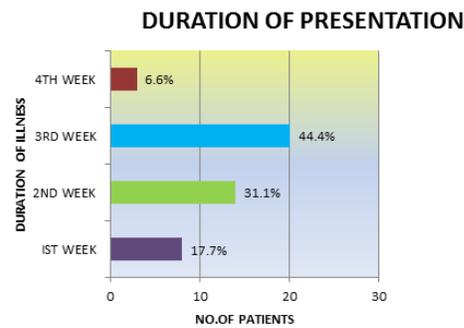
Enteric perforation seemed to occur in patients with fever duration of 2-3 weeks. Most of the patients presented during 2nd and 3rd week of illness.

Mean duration of fever before presentation was 16 days. Mean temperature was 101.3 F (Range 99.5-103 F).

Pulse rate ranged between 108-140 beats per minute with a mean pulse rate of 116.

**Table 5.** Distribution of duration of fever/illness at the time of presentation of patients studied

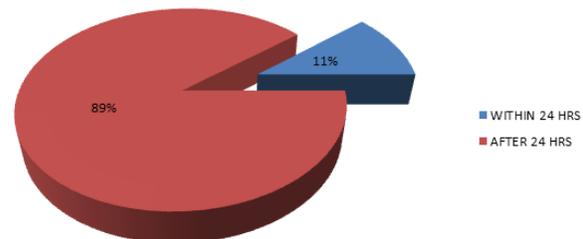
Duration of Fever (Days)	Number of Patients	Percentage %
Nil	0	0
<7	08	17.7
7-14	14	31.1
15-21	20	44.4
1>21	03	6.6
<b>Total</b>	<b>45</b>	<b>100.0</b>



### 3.2 Perforation-Admission Interval

5 patients presented early i.e., within 24 hours and 40 patients presented late i.e., after 24 hours.

**PERFORATION-ADMISSION INTERVAL**



6 patients had taken complete course of antibiotic treatment prior to admission, 32 patients took incomplete and inadequate antibiotic therapy. 7 patients had not received any prior antibiotic treatment. Inadequate treatment prior to admission was significant predictor of intestinal perforation.

### 3.3 Investigations

Widal test > 1:320 was positive in 35 (79.45%) cases.

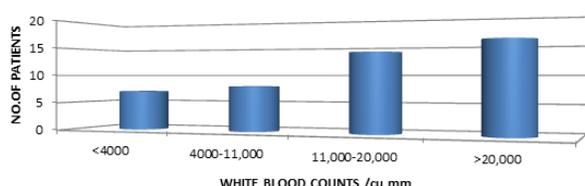
Although Leucopenia is a feature of typhoid fever, majority of patients 66.6% in our study group showed leucocytosis 35.5 % patients had WBC count >20000 cu

mm, 31.1% had counts between 11000-20,000 cu mm, 7% showed leucopenia and 8 patients had WBC counts within normal limits.

**Table 6.** White blood cell counts during admission

WBC	No. of Patients	Percentage (%)
0-4000	07	15.5
4000-11000	08	17.7
11000-20000	14	31.1
>20000	16	35.5

**WHITE BLOOD COUNT DISTRIBUTION**



**3.4 X-Ray Abdomen Standing**

Gas under diaphragm was present in all the patients included in our study.

**Table 7.** Ultrasound abdomen and pelvis findings

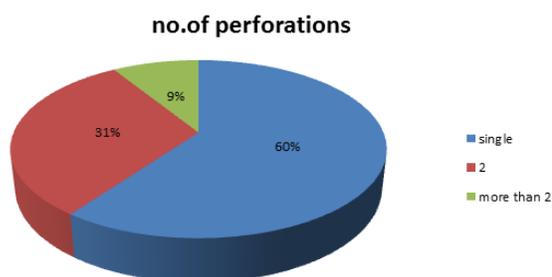
Amount of Free Fluid	No. of Patients	Percentage
NIL	3	6.6
MILD	16	35.5
MODERATE	13	28.8
GROSS	13	28.8

**3.5 Operative Findings**

Single perforation was found in 27 patients (60%), 2 perforations in 14 patients (31.1%) and more than 2 perforations were found in 4 patients (8.8%). Generalised peritonitis was present in 38 (84.4%) patients and minimal contamination was present in 7 (15.5%) patients. In all cases perforations were within the last 60cm of ileum.

**Table 8.** No. of Perforations

No. of Perforations	No. of Patients	Percentage (%)
1	27	60
2	14	31.1
>2	04	8.8

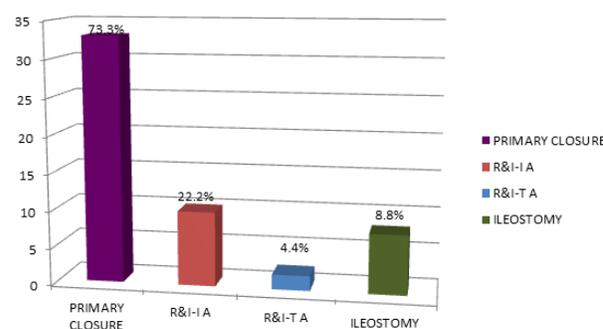


Surgery to be performed was decided by considering general health condition of patient, number of perforations, and amount of faecal/purulent contamination.

The most common procedure was primary closure of the perforations in 2 layers done in 33 cases (73.33%) after the edges were excised instead of refreshend. 1 patient had re-surgery for burst abdomen and 1 for enterocutaneous fistula between 3rd and 14th post-operative day. 10 patients underwent resection and end to end ileo ileal anastomosis whereas ileo transverse anastomosis was done in 2 patients with multiple perforations .

**Table 9.** Distribution of surgical interventions performed

Surgery Performed	No. of Patients	Percentage
Simple Closure	33	73.3%
Resection and Ileo-Transverse Anastomosis	08	22.2%
Without Ileostomy	02	
With Ileostomy	02	4.4%
Resection and Ileo-Transverse Anastomosis And Ileostomy	04	8.8%

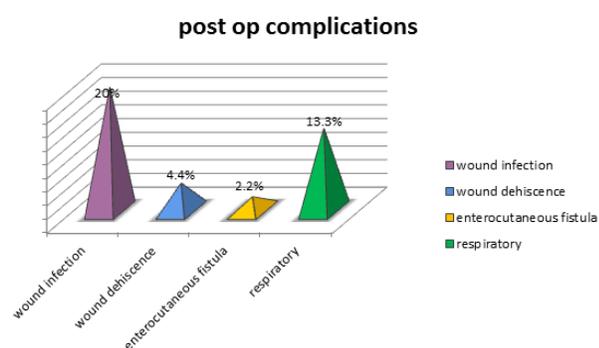


\*R&I-I A: Resection and ileo-ileal anastomosis.  
R&I-T A: Resection and ileo-transverse anastomosis.

The most common post-operative complication was surgical site infection followed by wound dehiscence. Enterocutaneous fistula was present in one case.

**Table 10.** Post-operative complications

Complications	No. of Patients	Percentage
Wound infection	09	20%
Wound dehiscence	02	4.4%
Enterocutaneous fistula	01	2.2%
Intra abdominal abscess	0	-
Respiratory complications	6	13.3%



### 3.6 Length of Hospital Stay

The overall length of hospital stay ranged from 3 to 34 days. Patients who had post operative complications stayed longer in the hospital and this was statistically significant.

**Table 11.** Length of Hospital Stay

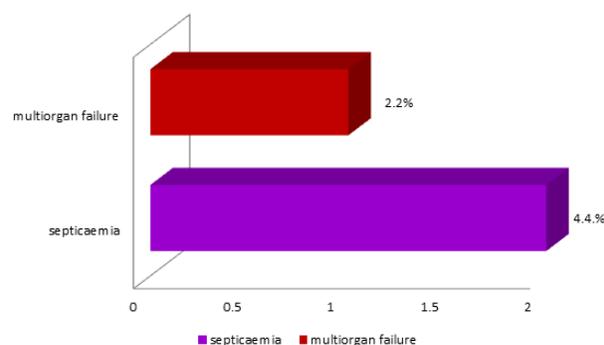
Length of Stay(Days)	No. of Patients
<5	01
5-10	11
11-15	13
16-20	07
21-25	10
25-30	02
31-35	01

### 3.7 Mortality

In this study, 3 patients died giving a mortality rate of 6.6%.

**Table 12.** Causes of mortality

Cause of Mortality	No. of Patients	Percentage
Septicaemia	2	4.4%
Multiorgan failure	1	2.2%



### 3.8 Follow up of Patients

38 (84.4%) patients were discharged well and 4 (8.8%) were discharged against medical advice. Regular follow up was possible in 28 patients upto 3 months.

## 4. Discussion

### 4.1 Age Incidence

In our study typhoid perforation was more common in second and third decades of life (57.7%). The age group 18-30 constitute a majority of the total number of patients. The youngest patient was 18 years old and oldest was 68 years old.

Similar finding was seen in a study by<sup>7</sup> 60.5% of patients were in the second and third decades of life.

63% were between 20 and 39 year age group in a study<sup>8</sup> conducted in Seoul, Korea i.e., 3rd and 4th decades<sup>8</sup>.

In another study<sup>9</sup> a total of 42.7% of the patients were in the 21-30 years age group i.e., third decade of life

In study by<sup>10</sup> 58.1% of patients were within their second and third decades of life. While in other similar studies<sup>11,12</sup> the highest incidence of typhoid intestinal perforation occurred in the first and second decades of life with 83% and 47% respectively.

### 4.2 Sex Incidence

In this study group, a majority of patients with ileal perforation were males 28 out of 45 (62.2%) and females were 17 (37.7%). This finding is similar to the findings in other studies.

In a study<sup>7</sup> there were 106 males and 18 females.

In a similar study conducted<sup>13</sup> male preponderance was found with male to female ratio of 6.5:1.

In series<sup>14</sup> out of 625, there were 435 male and 211

female patients and in study<sup>12</sup> Seventy- five (72.1%) patients out of 104 were males and 29 (27.9%) were females with male to female ratio of 2.6:1.

In series<sup>10</sup> there were 67 males (76.7%) and 20 (23.3%) females out of total of 86 patients.

However in a study<sup>15</sup> there were 64 patients out of which 31 were men and 33 were women while in a study by Steven and colleagues<sup>11</sup> there were 26 (49.1%) males and 27 (50.9%) females, thus the male:female ratio was 0.9:1.

### 4.3 Peak Incidence of Typhoid Perforation

The peak incidence of typhoid perforation was found in the second and third week of the onset of illness in our study (75.5%) and is consistent with the findings of other studies.

In study<sup>10</sup> 54 out of 86 (62.7%) presented in the second and third week of illness.

In study<sup>11</sup> twenty nine out of 53 (54.7%) patients presented within two weeks of onset of illness, and twenty four out of 53 (45.3%) presented after two weeks.

Most were seen after an illness of 2-4 weeks in the study by<sup>8</sup> with only 6 out of 161 patients presenting within first week.

In series<sup>12</sup>, majority (80.8%) presented within second week.

However in a study<sup>16</sup> an unexpected finding was that 13 out of 27 patients presented during the first week of illness.

### 4.4 Clinical Features

In our study the most common symptoms were prolonged history of fever and abdominal pain (100%).

Fever and abdominal pain were most common presenting symptoms in all patients in a study<sup>12</sup>. In the study<sup>16</sup> the most common symptoms at presentation were abdominal pain with signs of peritonitis (in 100% of patients), fever (92%), headache (81%), and vomiting (66%). Pain in abdomen was the most common clinical presentation (100%) followed by fever in the study<sup>13</sup>. In series<sup>17</sup> abdominal pain was seen in 60 (100%) patients and fever in 58 (96.6%). Most of the patients presented with abdominal pain, (90.7%) in study<sup>10</sup>. And fever was present in 50.1% patients.

Vomiting was present in 31 patients (66.6%) in our study. It was present in 90.4% of total patients in the study<sup>12</sup>. In study<sup>16</sup> vomiting was present in 66% patients while nausea and vomiting was present 70.9% in study<sup>10</sup>. In a similar study<sup>13</sup>, vomiting was present in 44% of patients.

Abdominal distention was present in 28 patients (62.2%) in our study.

In studies<sup>12</sup> abdominal distention was seen in 76% cases. In series<sup>10</sup> it was present in 75.6% cases and in the study<sup>13</sup> it was present in 50% patients.

In our study Guarding was present in 41 patients (91%). Tachycardia was present in 75.5% patients.

In the study<sup>17</sup> signs of peritonitis were present in 58 (96.6%) cases and in study<sup>12</sup> signs of peritonitis were present in 60.2% cases. In series<sup>10</sup> tenderness with guarding and abdominal rigidity with absent bowel sounds indicating generalized peritonitis was present in 70.9% patients.

Typhoid intestinal perforation was diagnosed based on clinical examination, laboratory investigation, presence of free air under the diaphragm on abdominal and chest radiographs and also intraoperative findings of peritonitis and perforation on antimesenteric border of bowel. 80-90% of cases are correctly diagnosed with radiological investigations. A erect abdominal or chest radiograph with free air under the diaphragm suggests perforated hollow viscus, but its absence does not exclude the diagnosis.

### 4.5 Radiological Investigations

#### 4.5.1 Erect Xray Abdomen

Evidence of free gas under the diaphragm on abdominal and chest xrays was found in all the patients included in our study.

In study<sup>7</sup> Pneumoperitoneum was demonstrated in 44 of 62 patients (71%). In a study<sup>12</sup>, chest and abdominal radiographs revealed pneumoperitoneum in 74.7% of cases. In a study by<sup>17</sup>, X-ray abdomen revealed pneumoperitoneum in 58 out of 60 patients (96.6%). Erect Anterior chest x-ray was performed in 58 out of 86 patients and 72.4% showed subdiaphragmatic free air in study<sup>10</sup>.

#### 4.5.2 Ultrasound Abdomen and Pelvis

In our study, ultrasound abdomen and pelvis was done to assess amount of free fluid in the abdominal cavity and to detect any underlying pathology. Moderate to gross free fluid was noted in 26 out of 45 patients (57.6%) pre-operatively. Gross free fluid more than 1000 ml had effect on mortality.

In similar study<sup>11</sup> patients with volumes <1ltr were forty-five (84.9%) out of which four died (8.9%); and eight (15.1%) patients had >1 ltr volume out of which four (50.0%) died.

Ultrasound done in 56 (53.8%) patients detected free peritoneal collections in 48 (85.7%) patients in the study<sup>12</sup>.

## 4.6 Laboratory Investigations

### 4.6.1 White Blood Count

Leucopenia is a common entity in uncomplicated typhoid fever. In study<sup>18</sup> reported leucocytosis in 59.5% of a total of 96 patients with typhoid ileal perforation.

In our study, 30 out of 45 (66.6%) patients showed leucocytosis whereas 7 patients (15.5%) showed leucopenia at the time of presentation. remaining 8 (17.7%) patients had WBC counts within the normal range.

In<sup>16</sup> study total WBC counts were  $>11 \times 10^9$  cells/L in 18 out of 27 patients (67%); and neutrophil leukocytosis (i.e., 75% neutrophils in a peripheral blood count) was apparent in 22 (81%) of 27 patients. In study<sup>14</sup>, out of total 646 patients total leucocyte count was found to be high in 598 patients with a mean of 16,500/cu.mm and less than 4000/cu.mm in 48 patients only.

The likely explanation is that perforation leads to secondary peritonitis and consequently rise in the white blood counts.

### 4.6.2 Widal test

Widal test was positive in 35 (79.45%) out of 45 patients in our study group.

In study<sup>12</sup> Widal test was positive (i.e., titre  $\geq 1$  in 160 dilutions) in 98 (94.2%) patients and in study<sup>10</sup> widal test was positive in 64.3% with titres of 1:160 or more for 'O' and 'H' antigens. While in the study by<sup>8</sup> Titers of 1:80 or greater were seen in 75% of patients tested.

## 4.7 Perforation-Admission Interval

Majority of patients in our study presented late in poor general condition. This was an important factor and had an influence on treatment outcome. This finding is highlighted by a number of authors in other studies. In countries with limited resources, difficulties in diagnosis and patient transfer is responsible for delayed presentation to a hospital.

In our study 5 patients (11%) presented early within 24 hours (early presentation) with no mortality and 40 patients (88.8%) presented after 24 hours (late presentation) with mortality rate 7.5% (3 out of 40).

In study by<sup>7</sup> the time interval between the perforation

and surgical intervention could be determined in 109 patients. The mortality in the 53 patients who were operated on within 48 h after perforation was 18.9% and in the 56 who were operated on after 48 h was 32.1%.

In a study<sup>11</sup> eight (15.1%) patients were operated within 24 hours with no recorded deaths, while 45 patients (84.9%) were operated after 24 hours and a mortality rate of 17.8% (eight out of 45 patients).

The perforation-surgery interval was more than 72 hours in 90 (86.5%) patients in the study<sup>12</sup>.

## 4.8 Operative Findings

Out of 45 patients in our study 27 patients had single perforation whereas 14 patients had 2 and 4 patients had multiple perforations i.e., 18 out of 45 had multiple perforations.

In study<sup>16</sup>, at surgery, 20 of 27 patients were found to have a single perforation, and the remaining 7 patients had multiple small intestinal perforations (range, 2–5 perforations).

In study<sup>7</sup> there were multiple perforations in 19 patients compared with 100 patients who had a single perforation.

In series<sup>11</sup>, thirty-eight patients (71.7%) had single perforations and 15 (28.3%) had 2 perforations.

In another study<sup>17</sup>, out of 60 patients 50 had single perforation (83.3%) on anti-mesenteric border of ileum followed by two perforations in 4 patients (6.66%) and multiple perforations in 6 patients (10%). And in the study<sup>12</sup>. Eighty-eight (84.6%) had single perforation and the remaining 16 (15.4%) patients had multiple perforations.

Sixty one out of eighty six (71%) patients had single perforation while 25 (29.1%) had more than one perforation in study<sup>10</sup>.

### 4.8.1 Surgical Intervention

In our study, several surgical interventions were performed. Primary closure in 2 layers was done in 33 out of 45 patients, resection with ileoileal anastomosis was done in 10 patients with 2 of them requiring ileostomy, resection with ileo-transverse anastomosis with ileostomy was performed in 2 patients and ileostomy alone was done in 4 patients.

In the study<sup>16</sup>, repair by simple closure, in which only suturing was necessary was done in 2 of 27 patients; debridement, wedge excision, and suturing in 13; drainage in 6; and temporary ileostomy in 4 patients.

In similar study<sup>11</sup> the majority of patients, 34 (64.2%), had primary simple closure of the perforations, whereas 19 (35.8%) had ileal resection with end-to-end anastomosis.

In study<sup>9</sup>, surgical management consisted of primary closure of the perforation (74.5%), closure with omental graft (14.5%), resection and anastomosis (3.6%), and only drainage (7.3%).

In study<sup>12</sup> simple closure of the perforations was the most commonly done procedure accounting for 78.8% of cases and this was generally done in two layers after excision the edges.

In a study<sup>17</sup>, Primary closure with or without covering ileostomy was done in 28 out of 60 (46.66%), exteriorization of perforation as ileostomy in 22 patients (36.66%), and resection and anastomosis in 8 patients (13.3 %) was performed.

In study<sup>13</sup> recommend that defunctioning ileostomy should be preferred over other surgical options in cases of ileal perforations.

In study<sup>10</sup>, Fifty two (60.5%) patients underwent simple one or two layer closure, Eighteen (21%) patients had resection and primary anastomosis. Seven (8.1%) patients had ileostomy and drainage. Five (5.8%) patients had primary suture with ileo-transverse anastomosis while 4(4.7%) patients had limited right hemicolectomy.

#### 4.8.2 Post Operative Complications

In our study wound infection was the most common post operative complication followed by respiratory infections, wound dehiscence/burst abdomen followed by enterocutaneous fistula. There was no evidence of intra abdominal abscess collections.

Wound dehiscence, and post-operative intra-abdominal collections including abscess were the most common complications requiring resurgery in a study<sup>14</sup>.

Wound infection was the most common postoperative complication in study<sup>13</sup>, about 36.67%. It was present in about 11 (36.67%) out of 60 cases followed by wound dehiscence, intra-abdominal collections, systemic complication, and anastomotic leak.

While in study<sup>11</sup>, Twenty-six (49.1%) patients developed various post-operative complications, which included wound infection in 14 (53.8%), wound dehiscence in two (7.6%) and burst abdomen in six (25.1%). Others included residual intra-abdominal abscess in four (15.4%) patients and enterocutaneous fistula in two (7.6%).

A total of 79.1% of patients developed wound infection and 10% of patients developed faecal fistula in the study<sup>9</sup>.

In study<sup>17</sup> post operatively wound infection was most common complication seen in 30 out of 44 patients (50%) followed by wound dehiscence in 4 (13.3%), anastomosis

leakage in 4 (6.6%), fecal fistula in 4 (6.6%), and intra abdomen abscess in 2 patients (3.3%).

In study<sup>12</sup> surgical site infection was the most common post-operative complication accounting for 55.5% of cases.

In study<sup>10</sup> wound infection topped the list as 63.0%, wound dehiscence at 15%, residual intra-abdominal abscess at 10.6%, cardiopulmonary complications at 4.5%, and faecal fistula at 3%.

Surgical site infections are more common in patients with shock because shock results in reduction of local perfusion which enhances susceptibility to infection and a little load of organisms is required to produce infection in presence of shock. Fluid and electrolyte imbalance was seen in all the patients and persisted for a varying period of length after surgery. Fluid and electrolyte imbalance results in inadequate perfusion of gastrointestinal tract and increases chances of SSI. Surgical site infection resulted in impaired mobility, increased hospitalization, delayed rehabilitation.

#### 4.9 Length of Hospital Stay

The overall length of hospital stay in our study was 3 to 34 days. In series<sup>13</sup>, the hospital stay of the patients was slightly longer in case of ileostomy (21.53 days) in comparison with primary repair (14.23 days). The duration of hospital stay for survivors was 8-57 days with a mean of 16.1 days.

The overall length of hospital stay ranged from 7 to 64 days with a median of 28 days in study<sup>12</sup>. Patients who had post-complications stayed longer in the hospital and this was statistically significant

#### 4.10 Mortality

The mortality rate in our study was 6.6%, 3 out of 45 patients died. All three mortality were in patients with multiple perforation thus shows that multiple perforation increases morbidity and mortality. The causes in our study were septicaemia and multi organ failure.

The overall mortality rate in the study<sup>9</sup> was 16.4%. Increasing the time interval between perforation and operation significantly increased the mortality. The mortality was least with early primary closure of the perforation. Patients with postoperative faecal fistula had higher mortality rates. The observation that of all the postoperative complications, the digestive fistula remains the most threatening is also emphasised in the series by<sup>9</sup>. Because it is likely to generate high morbidity and mortality. The fistula can result from an anastomotic leakage, can be a fistula that escaped notice during laparotomy closure, or

can be a new perforation developing postoperatively on a non-resected diseased ileum. Anastomotic leakage is by far the most frequent situation.

In study<sup>12</sup> mortality rate was 23.1%, 24 out of 104 patients died.

Mortality was 13.33% (n = 8) in the study<sup>17</sup>.

An overall mortality rate of 18.6% was seen in study<sup>10</sup>. Nine patients in their series died due to severe septicaemia and multiple organ failure, five patients died of faecal fistula and two patients due to severe respiratory failure.

In study<sup>11</sup> mortality was 15.1%. Mortality in patients with single and multiple perforations was 7.9% (three out of 38) and 33.3% (five out of 15 patients) respectively in their study. Multiple perforations and severe post operative complications increases rate of mortality.

In study<sup>7</sup> there were multiple perforations in 19 patients compared with 100 patients who had a single perforation. The mortality in the former group was 52.6% and in the latter group it was 19.0%.

Age and sex of the patients had no significant effect on prognosis and mortality in our study.

## 5. Conclusion

Ileal perforation is the most common surgical complication of enteric fever in India. Any patient being treated for typhoid fever who shows a sudden deterioration accompanied by abdominal signs should be considered to have a typhoid perforation until proven otherwise. It occurs more commonly in the 2nd and 3rd week of illness with male preponderance. A detailed history, clinical examination, presence of gas under diaphragm, biochemical investigations help to arrive at a correct preoperative diagnosis. Time of presentation, delayed operation, the number of perforations and extent of fecal peritonitis has a significant effect on the prognosis. Early and prompt diagnosis, adequate resuscitation and early surgery with good post operative care in such patients will improve survival and keep the mortality low.

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