

# Evaluation and Determination of Prognostic Factors in Typhoid Ileal Perforation

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## ABSTRACT

**Objective:** To determine the prognostic factors of typhoid ileal perforation. **Study Design:** A prospective study. **Place and duration of study:** The study was conducted in the departments of A&E and surgery at Allied Hospital Faisalabad, from September 1<sup>st</sup>, 2008 to August 31<sup>st</sup>, 2009. **Patients and methods:** With informed consent, the study was conducted on 56 patients who underwent laparotomy for peritonitis due to typhoid ileal perforation as per inclusion and exclusion criteria. The ileal perforations were managed by either primary simple transverse closure or primary defunctioning loop ileostomy. The prognostic evaluation was assessed by the impact of pre operative prognostic factors and per operative findings on post operative complications and mortality. For statistical significance, the data was analyzed by SPSS. **Results:** Among the total 56 patients, thirty four (61%) patients were managed by primary simple transverse closure while 22 (39%) patients had primary defunctioning loop ileostomy. The age and sex had no effect on the prognosis of typhoid ileal perforation. Mortality rate was 5.4%. Different post operative complications and their rates were burst abdomen 23%, residual intra abdominal

abscess 16%, fecal fistula 7% and septicemia 5.4%. Twenty eight (50%) patients developed wound infection which reflected only morbidity. Mortality remained nil in all those cases who had early presentation, admission-operation interval shorter than 12hours, size of perforation less than 1cm, amount of pus/fecal fluid less than 1000ml and had primary simple closure. Three mortalities (5.4%) occurred among the cases with primary loop ileostomy due to a significant impact of pre operative and per operative prognostic factors on post operative complications and had a significant association with late presentation, admission-operation interval longer than 12hours, multiple perforations with size more than 1cm, amount of pus/fecal fluid greater than 1000ml. **Conclusion:** Late presentation, longer admission-operation interval, multiple perforations, size of perforations more than 1 cm and massive amount of intra peritoneal feco-purulent fluid significantly and adversely affect the prognosis of typhoid ileal perforation irrespective the surgical procedure used to manage the perforation. **Key Words:** Typhoid ileal perforation, Laparotomy, morbidity, mortality, prognostic factors

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## INTRODUCTION

Typhoid fever represents the 4th most common cause of death in Pakistan<sup>1</sup>. Typhoid fever is important in surgery because of its serious abdominal complications such as intestinal perforation, bleeding, cholecystitis and pancreatitis<sup>2,3</sup>. Typhoid perforation of the ileum is one of the most common causes of bowel perforation in the developing world<sup>4</sup>. Perforation peritonitis is not only a serious complication of typhoid fever but also a significant surgical problem in developing nations, especially in the regions where standard medical facilities are not yet readily available<sup>5</sup>. According to different reports, mortality figures of

typhoid ileal perforation range between 1 to 43%, while the survivors have to face variable morbid situations due to different post operative complications especially wound infections<sup>6-8</sup>.

In spite of the evolutionary changes in medical treatment by specific and advanced antimicrobial therapies for enteric fever, cases of peritonitis due to typhoid ileal perforation are still commonly received and managed in our surgical units. Though, the surgical intervention has played a revolutionary role in reducing the mortality and morbidity of typhoid ileal perforation from 100% to negligible levels<sup>8-10</sup>, but still, certain factors such as late presentation, in-

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adequate pre-operative resuscitation, delayed operation extent of intra peritoneal contamination, number, size and site of ileal perforations may have a significant impact on the prognosis.

Despite the high mortality and morbidity of typhoid ileal perforation in developing world, relatively a little is known about its prognostic factors in our set up. This study was planned to determine the factors which affect the prognosis of typhoid ileal perforation in our set up by comparing our results with that of the national and international literature. This manner for the identification of prognostic factors in typhoid ileal perforation will help us in decision making policies to prioritize the management strategies and hence improving the quality of health care.

### **AIMS AND OBJECTS**

- 1) To determine the factors which influence the prognosis of typhoid ileal perforation.
- 2) To prioritize the modalities of management in typhoid ileal perforation for improving the standards of health care.
- 3) To evaluate the prognostic factors affecting post operative complications in typhoid ileal perforation.

### **PATIENTS AND METHODS**

This prospective study was conducted on 56 patients of typhoid ileal perforation as per inclusion and exclusion criteria at Allied Hospital Faisalabad from September 1<sup>st</sup>, 2008 to August 31<sup>st</sup>, 2009. All the patients were admitted, evaluated and operated in A&E department while their post-operative monitoring and management was done in surgical units.

### **INCLUSION CRITERIA**

Following patients were included in the study.

- Patients operated for peritonitis with clinical features of enteric fever and their diagnosis for typhoid ileal perforation was confirmed.
- Patients with age above 12 years irrespective of their sex.

### **EXCLUSION CRITERIA**

Following patients were excluded from the study.

- Patients of ileal perforation whose diagnosis of typhoid perforation could not be confirmed.
- Patients with clinical diagnosis of typhoid perforation peritonitis but unfit for anesthesia.

- Patients with comorbid medical problems like decompensated liver disease, acute/chronic renal failure, cardiac failure and uncontrolled diabetes mellitus.
- Cases of peritonitis other than typhoid ileal perforation.

### **OPERATIONAL DEFINITION**

**Early and late presentation:** The patients who developed clinical features of peritonitis after typhoid fever and presented within 24 hours were labeled as early while those presented after 24 hours were marked as late cases.

**Adequate resuscitation:** Resuscitation was considered to be adequate with following parameters.

- Haemoglobin level 10 or above 10gm/dl.  
Urine output about one ml/min for at least 2 hours.
- Serum electrolytes, urea, creatinine and glucose random with in their normal ranges (Sodium=135-150mEq/L, Potassium= 3.5-5.0 mEq/L, Chloride=96-106 mEq/L Bicarbonate; 23-29 mEq/L, Urea =18-45 mg/dl, creatinine =0.3-1.2mg/dl and glucose random =100-140 mg/dl).
- Oxygen saturation =100%

### **AGE AND SEX DISTRIBUTION**

Regarding age and sex, the patients were divided into groups and their mean age was calculated.

### **PRE OPERATIVE EVALUATION**

All the patients were thoroughly evaluated by history, clinical examination and relevant investigations for resuscitation and to establish the diagnosis. Pre-operative resuscitation included intravenous fluids, antibiotics (intravenous ciprofloxacin and metronidazole) and correction of electrolytes derangements. Urinary output and levels of haemoglobin, serum electrolytes, urea, creatinine, random glucose and blood oxygen saturation as per their ranges given in operational definition were considered good indicators of adequate resuscitation. The provisional diagnosis of typhoid ileal perforation was established by clinical features of enteric fever and peritonitis which were supported by positive typhidot / widal tests, detection of free air under the diaphragm on chest and abdominal radiographs and free intra peritoneal fluid on ultrasound abdomen. The duration of resuscitation from the time of admission to operation was recorded.

## OPERATIVE TECHNIQUE

After adequate resuscitation, the patients were assessed by the anaesthetist prior to surgery. Under general anesthesia, the abdomen was explored through midline incision. Amount of intra peritoneal pus and faecal fluid drained was measured. Number, size and sites of ileal perforations were noted. The edged tissue of ileal perforations was excised and sent for culture and histopathology reports. Perforated ileum was managed by primary simple closure in two layers with vicryl 2/0 in patients who had early presentation, intra peritoneal pus/ fecal matter less than 1000 ml, single perforation and size of perforation up to 0.5 cm. While, all the rest of the patients were managed by exteriorization of perforated ileum as temporary primary loop ileostomy. The peritoneal cavity was irrigated with four litres of normal saline. Drains were inserted to drain the right paracolic gutter and the pelvic cavity. The midline incisions were closed as mass-closure with propylene and skin with black silk.

## DIAGNOSIS

The preoperative probable diagnosis of typhoid ileal perforation was confirmed by edge biopsy of ileal perforation and culture report along with per-operative findings; i.e. inflamed and edematous terminal ileum with perforations (single or multiple) at the anti mesenteric border.

## POST OPERATIVE MONITORING

After recovery from anesthesia, the patients were shifted to surgical units and their post operative outcome was closely monitored. The outcome was evaluated in terms of post operative complications such as wound infection, wound dehiscence/burst abdomen, residual intra-abdominal abscess, entero-cutaneous fistula, septicemia and mortality.

## STATISTICAL ANALYSIS

The data was analyzed by Chi square / t -test and degree of freedom was also calculated to see the signification of results.

## RESULTS

Among the 56 patients included in study, there were 40 (72%) males and 16(28%) female patients. Age of the patients ranged from 12 to 60 years with a mean of 30 years. Age-wise distribution of the patients and their groups are shown in the table (Table-1)

**Table 1:**

**Age-wise Distribution of Patients**

Groups/ Age(Yrs)	Number of patients	Percentage
12 to 20	17	30%
21 to 30	15	27%
31 to 40	14	25%
41 to 50	06	11%
51 to 60	04	07%

Thirty nine (70%) and seventeen (30%) patients had early and late presentation respectively. Forty four (78%) patients underwent laparotomy with in 12 hours of presentation, while twelve (22%) patients took 12 to 36 hours for adequate resuscitation before surgery.

Per operatively, a single perforation at anti mesenteric border of ileum within 2 feet of ileocecal valve was found in 48 (85%) patients, while rest of 8 patients (15%) had two or more than two(multiple) perforations. Amount of intra peritoneal pus/fecal fluid ranged from 150ml to 2400ml. Pus/ fecal fluid drained, was found to be more in cases with late presentation, multiple perforations or having size of perforations larger than 1cm. Considering the pre operative status and operative findings, thirty four (61%) and twenty two (39%) patients were managed by primary simple closure and temporary primary loop ileostomy respectively.

Post operative complications along with their rates were wound infection (50%), wound dehiscence/ burst abdomen (23%), residual intra abdominal abscess (16%), entero-cutaneous fistula (7%), septicemia (5.4%) and mortality (5.4%). The patients who developed septicemia, their mortality remained 100%. All these post operative complications, other than wound infection, were particularly found in patients who had late presentation, multiple perforations, size of perforations greater than 1cm and intra peritoneal pus/fecal fluid more than 1litre which reflected the extent of contamination. Different variables and their association with prognosis in typhoid ileal perforation along with statistical analysis is shown in the table-2.

**Table 2:**  
**Variables and their Association with Prognosis**

Sr. No.	Variables / prognostic factors		Patients with prognostic factors out of total 56 patients		Mortality in patients with prognostic factors		Chi Square/ t-test	Degree of freedom (dm)	P Value	Gamma
			Number	%age	Number	%age				
1	Sex	Male	40	72 %	2	5 %	2.54	1	.193	.696
		Female	16	28 %	1	6.25 %				
2	Stage of presentation	Early (<24 hrs )	39	70 %	0	0 %	7.27	1	.007**	1.00
		Late (>24 hrs )	17	30 %	3	17.65 %				
3	Admission – Operation interval	Short (<12hrs )	44	78 %	0	0 %	11.62	1	.001**	1.00
		Long (>12hrs )	12	22 %	3	25 %				
4	Number of perforations	Single	48	85 %	1	2.08 %	7.10	1	.008**	.880
		Multiple (>1 )	8	15 %	2	25 %				
5	Size of perforations	0.5 cm	34	61 %	0	0 %	16.55	1	.000**	1.00
		0.6 -1 cm	13	23 %	0	0 %				
		>1 cm	9	16 %	3	33 %				
6	Amount of pus/fecal peritoneal fluid (ml)	< 1000 ml	36	64 %	0	0 %	5.70	1	.017*	1.00
		> 1000 ml	20	36 %	3	15 %				
7	Operative procedure	Primary simple closure	34	61 %	0	0 %	4.89	1	.027*	1.00
		Primary loop ileostomy	22	39 %	3	13.64 %				
8	Wound dehiscence / Burst abdomen		13	23 %	3	23 %	10.48	1	.001**	-1.00
9	Intra abdominal residual abscess		9	16 %	3	33 %	16.55	1	.000**	-1.00
10	Fecal fistula		4	7 %	2	50 %	16.93	1	.000**	-.962
11	Septicemia		3	5.4 %	3	100 %	56.00	1	.000**	-1.00

Highly significant (\*\*), Significant (\*), Non significant (NS)

### DISCUSSION

Despite the world wide improvements in public awareness about health, hygiene and good sanitation, typhoid enteric perforation is still rising day by day in some parts of the world. In accordance with most reports, prognosis of typhoid ileal perforation remains poor in the tropical environment with high morbidity and mortality<sup>4-10</sup>. The ileum especially its distal two feet, in typhoid fever becomes edematous and friable. Without appropriate and timely therapeutic measures, this diseased ileum may perforate resulting in typhoid perforation peritonitis. Typhoid perforation peritonitis may be due to a single or multiple perforations of ileum at anti mesenteric border. Sometimes however, there are impending perforations which make surgery not only difficult but also increase the morbidity and mortality<sup>11, 12</sup>.

Up to 1960, the surgical intervention had not been well defined and enteric perforation was considered almost fatal as conservative management was the mode of treatment to be suggested by most of the surgeons.<sup>13</sup> But since 1970, surgical intervention to manage the typhoid perforation peritonitis is being preferred by most of the surgeons as it has sharply reduced mortality from 70—100% to 30%.<sup>7-9, 14, 15</sup> It is now universally accepted that the treatment of typhoid perforation must be surgical.<sup>16</sup> Moreover, some developing countries have reported that an early surgical intervention has further improved the prognosis with mortality rates up to 6.8-7% and up to 1-2% in regions of developed world where socioeconomic infrastructure is well established.<sup>17-19</sup> This improvement in prognosis and quality of health care of patients suffering from typhoid ileal perforation has a strong attribution to various operative procedures advocated by different authors, such as simple peritoneal lavage under local anesthesia in moribund conditions<sup>7,20-21</sup>, tube ileostomy<sup>22</sup>, closure

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of perforation with end to side or side to side ileo-transverse colostomy<sup>23</sup>, wedge excision or segmental resection of diseased ileum with end to end anastomosis<sup>20,24-26</sup>, edge excision of perforated ileum with simple primary transverse closure in single or two layers<sup>10,16,20,26</sup> with or without omental patch<sup>25,27-28</sup> and finally construction of temporary defunctioning primary loop ileostomy.<sup>8,29-30</sup>

Though, the surgical management of typhoid perforation has progressed quite a lot, even then all the surgical procedures reported yet, have had a high risk of post operative complications and mortality. The post-operative complications not only have serious impact on each other but also affect the prognosis. Wound infections adversely affect the development of residual intra-abdominal abscesses and enterocutaneous fistulas at one hand, while the incidence of residual intra-abdominal abscess is enhanced by the presence of entero-cutaneous fistula on the other hand. Moreover, wound infections significantly contribute to develop the wound dehiscence/burst abdomen which creates a moribund ground to favour the emergence of entero-cutaneous fistula, septicemia and sometimes mortality.<sup>7-10,12,16,20</sup>

Our strategy in managing these patients was to do as much as necessary but as little as possible. A swift and effective procedure was practised by laparotomy with removal of all the contaminated material, edge excision of perforated ileum, primary simple transverse closure or primary defunctioning loop ileostomy, peritoneal irrigation and closure of the abdominal wall.

Overall mortality rate of our study remained 5.4% (three patients). Mortality rate in relation to different post operative complications was 23% in burst abdomen, 33% in residual intra abdominal abscess, 50% in entero-cutaneous fistula and 100% in septicemia. All the three mortalities (5.4%) happened in patients who had primary loop ileostomy, while no mortality was found in cases with simple primary closure of perforations. However, a critical observation of results showed that all mortalities were due to serious post operative complications and had a significant relation to late presentations, longer admission-operation intervals, multiple perforations or massive intra peritoneal contamination instead of specific complications of loop ileostomy. Mortality in cases with burst abdomen was found only in those patients who developed residual abscesses or enterocutaneous fistula and later septicemia.

Mortality rates of typhoid ileal perforation reported in different local and international studies are 28%<sup>2</sup>, 22.35%<sup>8</sup>, 15.2%<sup>31</sup>, 10.5%<sup>32</sup>, 7%<sup>18</sup>, 6.8%<sup>33</sup> and 1.5-2%<sup>34</sup>. Results of these studies have also reported negligible mortality particularly in patients who had early presentation, single perforation and minimal peritoneal contamination. These studies have further highlighted that late presentation, delayed operation, multiple perforations and drainage of copious quantities of faecopurulent fluid from the peritoneal cavity adversely affect the incidence of burst abdomen, residual abscess, enterocutaneous fistula and the mortality, irrespective the surgical procedure adopted to manage the ileal perforations.

Four patients (7%) in our study developed post operative enterocutaneous fistula in comparison to 16.5%<sup>32</sup>, 7.8%<sup>33</sup>, 3.7%<sup>35</sup>, 8%<sup>36</sup> and 10%<sup>37</sup>, reported in literature. Incidence of wound dehiscence / burst abdomen in this study was 23% in comparison to 34%<sup>7</sup>, 25.1%<sup>35</sup> and 7.6%<sup>38</sup> given in different studies of literature. Rate of residual intra abdominal abscess of our study was 16% in comparison to 15.4%<sup>35</sup> and 9.5%<sup>38</sup> shown by studies conducted in Nigeria and West African rural hospital. Morbidity of wound infections in our study was 50% in comparison to rates of different studies 23%<sup>32</sup>, 53.8%<sup>35</sup>, 67%<sup>39</sup> and 29.3%<sup>40</sup> given in literature.

These comparative observations show that the prognostic figures of our study regarding post operative enterocutaneous fistula, wound dehiscence/burst abdomen and mortality are relatively better than most of the studies in literature. On the other hand, prognostic value of residual intra abdominal abscesses and wound infections was either comparable or slightly higher than those of literature. However, when observed critically, the results of our study and literature had showed a strong association of mortality and morbidity to late presentations, longer presentation-operation intervals, multiple perforations and extensive peritoneal contaminations. The prognostic improvement in our study was probably due to our aggressive time-detected management regarding severity of disease and selection of appropriate surgical procedure to do as much as necessary but as little as possible in addition to our strict inclusion and exclusion criteria.

In conclusion, aggressive resuscitation, antibiotics and early surgery has a definite role minimizing the mortality and morbidity of typhoid ileal perforations. Early surgery has a better outcome but no uniformity

exists regarding opinion about the operative procedures to deal the perforations. However, It is our experience that extensive oedema and fragility of ileum precludes any suturing. Therefore, exteriorization of the perforation as a temporary loop ileostomy is the safe and fastest procedure to be done, although, it has its own morbidity. A primary simple closure or anastomosis is a better choice only when the patient presents early and the bowel is healthy. The choice of surgical procedure should be undertaken in accordance with condition of the patient and typhoid ileum because it is the severity and extent of disease in addition to peri-operative factors which have a significant impact on the prognostic outcome in typhoid ileal perforation rather than the kind of surgical procedure used.

### CONCLUSION

- 1) Late presentation, longer admission-operation interval, multiple ileal perforations and severe peritoneal contamination have adverse impact on the mortality and morbidity of typhoid ileal perforation.
- 2) Post operative burst abdomen plays a significant role to develop residual intra abdominal abscess, entero-cutaneous fistula, septicemia and mortality.

### RECOMMENDATIONS

Early diagnosis, most appropriate surgical intervention and an effective peri-operative care may prove to have a significant role in better health care and survival of the patients with typhoid ileal perforation.

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