

Research Article

Typhoid intestinal perforation in Central India – A surgical experience of 155 cases in resource limited setting

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Abstract

Introduction: Typhoid fever is a major public health problem in developing countries of Africa and Asia. India has highest incidence worldwide. This disease is transmitted by faeco-oral route and it exists as an endemic disease, Asia, Africa and Latin America are having higher counts for disease. In South-East Asia, there is high incidence of morbidity and mortality due to intestinal perforation. The management of typhoid intestinal perforation poses a unique challenge to treating surgeon. Our purpose of conducting this study was to reveal our clinical experience in surgical management of enteric perforation.

Materials and Method: It is a retrospective study of patients who were operated for typhoid intestinal perforation at Bundelkhand Medical College and Associated District Hospital, Sagar, India, between August 2008 and October 2013; after approval from institutional ethics committee this study was started. The data of patients who were presented with typhoid perforation was retrieved from medical records department of hospital. In all cases Widal test was positive for typhoid. Laparotomy was performed by midline incision. Management of perforation was dependant on the type of severity of disease.

Results: In our study 155 patients were studied at an average of 31 cases annually. In our study male to female ratio was 6.38:1. The median age was 28.66 years. The peak incidence was between 21 to 30 years. The majority of patients came from rural area. All the patients were presented with fever and abdominal pain. 139 (89.67 %) patients presented late after 24 hour of acute abdominal pain with inadequate treatment. X-ray abdomen of 130 (83.87%) patients showed free gas under right dome of diaphragm. Widal test was positive in all the patients. All patients in this study underwent emergency laparotomy. In 90 % of the cases perforation was in terminal 25 cm of the ileum. Various type of surgical repair techniques were applied on the basis of number of perforations, degree of contamination, shock, presence of other co-morbid conditions. 34 patients underwent reoperation, 119 (76.77%) patients had post-operative complication with the most common complication being the surgical site infection. The median hospital stay was 21.56 days. Patients who had postoperative complication stayed longer in the hospital. In our study the mortality rate was 15.48%.

Conclusion: Typhoid intestinal perforation is a significant health problem with high morbidity and mortality in rural India. In management of this disease, early and appropriate surgical intervention is vital, with emphasis on preventive measure of typhoid fever.

Keywords: Enteric perforation; Surgical management; Complications; Morbidity; Mortality

1. Introduction

Typhoid fever is caused by a gram negative bacteria *Salmonella typhi*; it is a major public health problem in developing countries of Africa and Asia. The incidence of typhoid in Asia is around 274/100,000 persons per year.¹ India has highest incidence worldwide.² According to a study done in Kolkata in year 2008 showed the disease incidence of 214.2/100,000 population /year.³ This disease is transmitted by faeco-oral route and it exists as an endemic disease, where water supply and sanitation is poor. Around 1 % of population up-to the age of 17 years in India yearly suffers once from this disease⁴ the statistical data shows that, there were approximately 1.03 million cases and 421 deaths in 2009⁵, with many more under-reported cases from rural area makes this picture bit serious. With the emergence of multi-drug resistant strains, there are high incidences of morbidity and mortality.⁶ This disease has a further socio-economic impact as it affect young adults causing loss of daily wages and economic burden on society.

Intestinal hemorrhage has been reported between 0.8 % to 18%, which is most common complication of typhoid fever, ileal perforation continues to be the most frequent reason behind high morbidity and mortality, especially in remote areas where there is lack of good medical facility.^{7,8,9} Generally, hemorrhage and perforation occurs at terminal ileum secondary to necrosis of Peyer's patches.¹⁰ The risk of perforation is higher in males, patients with leucopenia, short duration of disease, emergence of multidrug resistant strains and incomplete antibiotic treatment.¹¹

The management of typhoid intestinal perforation poses a unique challenge to treating surgeon because of late presentation due to various reasons; late diagnosis, treatment by quacks initially, injudicious use of steroids, poor awareness, poverty, lack of transport facility and poor medical facility.¹²

Mortality in cases of perforation is around 9% - 22% in developing world, when compared to developed world (0%-2%). The reasons behind are inadequate resuscitation, lack of Intensive care, antibiotic resistance, local taboos, delayed operation, number of perforations, faecal peritonitis and duration of disease.¹³

Our purpose of conducting this study was to reveal our clinical experience in surgical management of enteric perforation, its outcome and to determine the prognostic factors for morbidity and mortality in our remote setting. It is hoped that identification of these factors will help in policy making, prioritizing management and improving the quality of care in cases of enteric perforation.

2. Materials and Method

It is a retrospective study of patients who were operated for typhoid intestinal perforation at Bundelkhand Medical College and Associated District Hospital, Sagar, India, between August 2008 and October 2013; after approval from institutional ethics committee this study was started. All patients those were operated for typhoid perforation during this study period were included. The data of patients who were presented with typhoid perforation was retrieved from medical records department of hospital. The diagnosis of enteric perforation was established by clinical features of typhoid fever and peritonitis, positive Widal test, presence of free gas under diaphragm, intra-operative presence of oval perforation at anti-mesenteric border of intestine with acutely inflamed and oedematous intestine.

If the patient was admitted within 24 hours of perforation was considered as early case while the case beyond that was considered as a late case. The time of perforation was determined by sharp excruciating abdominal pain and worsening of symptoms. In children the time of perforation was estimated by the history; when mother noticed abdominal distension with excessive cry on abdominal pressure with development of constipation or diarrhoea and vomiting.

Preoperative shock was managed, nasogastric suction, Foleys catheterization and broad spectrum antibiotic coverage was started. Relevant preoperative investigations included complete blood count, blood sugar, blood urea, serum creatinine, serum electrolytes, X-ray chest and abdomen; test for hepatitis and Human immunodeficiency virus (HIV) test are part of our routine investigations prior to any major surgery. Laparotomy was performed by midline incision under spinal anaesthesia and after suction of all purulent material, careful inspection of intestine was done. If intestine surrounding the perforation was found to be having minimal inflammation than primary repair was done using polyglactin 3-0 on round body needle.

If the patient had preoperative shock with perforation operation interval more than 24 hrs, with severe contamination and inflammation of intestine surrounding the perforation then ileostomy was done.

In case of multiple perforations stoma was made from proximal most perforation with primary repair of all distal perforations. In case of multiple perforations with minimal contamination without shock, resection and anastomosis of ileum was considered. Peritoneal lavage was done with warm normal saline. Mass closure of abdomen was done using polypropylene 1 and skin was closed with nylon 3-0 after keeping abdominal drains. In postoperative period nasogastric suction was continued until the patient developed gut activity, abdominal drains were removed on 5th day and intravenous antibiotic was continued till 7th postoperative day.

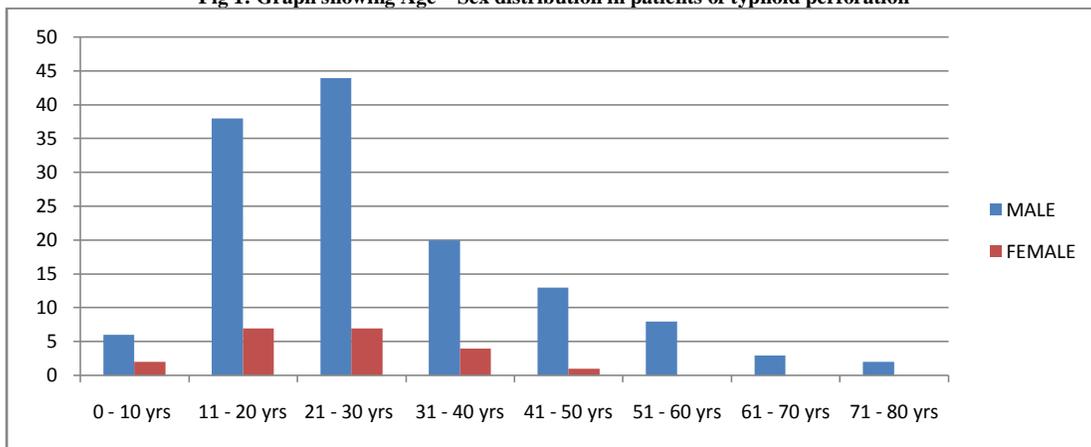
The data for study included sociodemographic profile, history of fever, perforation operation interval, presence of shock, number of perforations, degree of peritoneal contamination, operation done and postoperative complications including wound infection, burst abdomen, faecal fistula, duration of stay in hospital, morbidity and mortality.

3. Results

Out of 157 patients who were admitted in surgical ward with perforation, 2 patients were excluded from the study as they were having Crohn's disease. Thus 155 patients were studied at an average of 31 cases annually.

In our study the male to female ratio was 6.38:1. The age ranged between 6 months to 80 years with a median age of 28.66 years. The peak incidence was between 21 to 30 years, accounting for 32.90% of cases (Figure 1). The majority of patients came from rural area 148 (95.48 %). As far as education is considered 40 patients were illiterate, 81 had primary education, 28 were educated up to middle school and 6 patients had completed their graduation.

Fig 1: Graph showing Age – Sex distribution in patients of typhoid perforation



All the patients were presented with fever and abdominal pain. 122 (78.70%) patients presented within 2 weeks of fever while 33 (21.29%) patients presented after 2 weeks. 139 (89.67 %) patients presented late after 24 hour of acute abdominal pain. All the patients had inadequate treatment, either inappropriate antibiotic or for inadequate time and some patients had not even received any antibiotic.

3.1 Investigations

X-ray abdomen of 130 (83.87%) patients showed free gas under right dome of diaphragm. Widal test was positive with titre of 1 in 160 dilutions in all the patients. None of the patient had HIV infection. Histological examination from edges of perforation was typical of chronic inflammation.

All patients in this study underwent laparotomy. 139 patients presented after 24 hours of perforation in the hospital, but the admission-operation interval in 120 (77.41%) patients was less than ten hours. 115 patients had heavy contamination of the peritoneal cavity with more than 1000 ml of pus and faecal matter, while rest of the patients had minimal contamination. Ileum was the most commonly affected organ while in two cases perforation was found in jejunum and in 1 case it was in ascending colon. In 90 % of the cases perforation was in terminal 25 cm of the ileum. In 89% of the cases the perforation size was around 1 cm, in 11 % of cases it was 1.5 – 2.5 cm.

Various type of surgical repair techniques were applied on the basis of number of perforations, degree of contamination, shock, presence of other co-morbid conditions. Simple closure in two layers was the most common procedure performed in patients (114 patients). In

case of septicaemia with severe contamination and shock; in 21 patients ileostomy was done, in 17 patients of multiple perforation with no shock or chest infection at the time of admission resection and anastomosis was done. Three patients require special mention, two patients had simultaneous appendicitis and one patient had diverticulitis with enteric perforation so their required surgery was done. 34 patients underwent reoperation, in 4 patients ileostomy was done for leak, in 11 patients for intra-abdominal abscess re-laparotomy was done and for burst abdomen in 18 patients' tension suturing of abdomen was done.

During follow up 4 patients were re-operated for post operative intestinal obstruction and 12 patients were managed by conservative approach. Stoma closure was successfully done in 25 patients, without any residual complications. 119 (76.77%) patients had post-operative complication with the most common complication being the surgical site infection.

The overall length of hospital stay ranged from 7 days to 48 days with a median of 21.56 days. Patients who had postoperative complication stayed longer in the hospital. In our study, 24 patients died of disease and the mortality rate was 15.48%. Of the survivors, all the patients were discharged, and 124/131 (94.64%) came for follow-up after two weeks, but the follow-up after 3 months was only 16/131 (12.21%).

Table-1: Clinical features of enteric perforation

Clinical features	Frequency	Percentage
Fever	155	100%
Abdominal pain	155	100%
Distension	121	78.06%
Dehydration	118	76.12%
Constipation	114	73.54%
Vomiting	48	30.96%
Shock	44	28.38%
Chest infection	35	22.58 %

Table-2: Complications with their frequency

Early	Wound infection	119	76.77%
	Chest infection	29	18.70%
	Burst abdomen	18	11.61%
	Faecal fistula	15	9.67%
	Prolonged paralytic ileus	7	4.51%
Late	Intra-abdominal abscess	11	7.09%
	Post operative obstruction	16	10.32%
	Ventral hernia	5	3.22%
	Keloid	9	5.08%

Table-3: Predictor of mortality and their statistical significance

Predictor		Survivor	Non-Survivor	p-value
Age	< 40	97	21	0.1979
	>40	24	3	
Sex	Male	112	22	0.5325
	Female	21	2	
Fever Perforation interval	<2 wk	108	18	0.3989
	>2 wk	23	6	
Number of Perforation	Single	116	23	0.4693
	Multiple	15	1	
Peritonitis	generalized	101	23	0.0484
	Localized	30	1	
Admission interval	>24 hr	110	24	0.0458
	<24 hr	21	0	
BP on admission	<90 mmHg	26	18	<0.0001
	>90 mmHg	105	6	
Pre-hospital antibiotic therapy	Inadequate	109	24	0.0261
	Adequate	22	0	
Complication	Present	95	24	0.0013
	Absent	36	0	

4. Discussion

Intestinal perforation is the most serious complication of typhoid fever as it is associated high morbidity and mortality. The incidence of typhoid fever varies in different parts of the world. Intestinal perforation is an indicator of endemicity of in cases of typhoid fever. Worldwide the perforation rate ranges from 0.6 % to 4.9 % except Africa where the rate are as high as 10 % - 33 %.¹⁴ The higher rate of enteric perforation in our region is because of the presence of multiple risk factors like; poverty, drought, high employment rate, illiteracy and development of multi-drug resistance strains.

Youth of economically productive age in twenties and thirties are the most vulnerable victims^{6,15}, it is possibly because of the fact that this is the most adventurous part of life with the habit of consumption of street food, poor hand hygiene, ignorance towards health. These facts require an urgent public health policy measure by providing safe sewage disposal, safe drinking water and typhoid vaccination to reduce the risk of the enteric fever. Enteric perforation in the present study was more common in males 134 (86.45%) as compared to females possibly because males have more risk of exposure due to consumption of street food a when they are away from home for employment may lead to frequent contact with causative bacteria.²⁷

Enteric perforation is more common in low socio-economic status because of low level of education, unemployment; they live in remote areas where accessibility to health care facility and awareness for disease and hygiene is very poor.¹⁵

Commonest clinical presentation of enteric perforation in patients is abdominal pain and fever.^{18,19} In typhoid fever typically perforation occurs in the third week of disease but in our setup 126 (81.29%) patients developed it in second week. It is because of high virulence, low immunity and hypersensitivity of Peyer's patches.^{13,20}

In countries of developing world, majority of the patients present late, due to poor infrastructure of health care system with delayed diagnosis, treatment of acute abdomen initially by local non medical persons, poor transport facility in remote areas, especially in rainy season due to poor infrastructure, patient and family ignorance, these factors seriously affects morbidity and mortality.^{8,21}

The diagnosis of typhoid perforation is made on the basis of clinical features, free gas under the dome of diaphragm, positive Widal test more than 1:160 dilution and operative findings.^{21,22} In our study, X-ray for free gas under diaphragm was positive in 130 (83.87 %) patients, in contrast to other studies (only 50 %– 60 %).^{20,23}

Standard treatment of typhoid intestinal perforation is the surgical intervention.^{7,12,19,20} One of the important factor affecting the outcome in typhoid intestinal perforation is duration between perforation and operation, increased duration is associated with, severe peritonitis, hypovolaemia and septicemic shock. In our study this interval in 144 (92.90 %) patients was more than 24 hours. There are various reasons for this delayed presentation; most of the patients are from rural area where no trained medical staff available, and most of them being farmer by occupation, at the time of cultivation and harvesting family's first priority becomes earning. These patients are treated initially by quacks, who have no idea of this disease, patient initially choose medication in the hope of cure, even some physicians fail to think this pathology in their differential diagnosis and delayed referral.²⁵

Majority of patients had single perforation 139 (89.67%), the number of perforations also influence the prognosis.^{13,18,19,20} There is high incidence of residual abscess in patients with single perforation,²⁶ and there is better outcome in cases of single perforation,²⁷ we did not found any correlation of morbidity and mortality with no of perforations.²⁸ but there was high Incidence of leak in cases of perforation more than 2 centimetres in size, patient admitted with shock and chest infection.

Although typhoid fever can affect intestine from stomach to rectum but in our study most commonly affected organ was ileum 152 (98.06%), rare in jejunum 2 (1.29%) and colon 1 (0.64%) high incidence of ileum involvement is because of high number of Peyer's patches in the ileum, while colonic involvement is because of direct bacterial invasion.^{29,30}

The various types of surgical procedures have been discussed for the management of typhoid perforation ranging from primary repair in two layers, resection and anastomosis, ileostomy, primary repair with ileo-transverse bypass and peritoneal drain in moribund patient. The most commonly done procedure in our study was primary repair 113 patient (72.90%) like other studies^{18,19,20,22,32} because of simplicity of procedure, less time consuming, but disadvantage of this procedure is danger of faecal fistula formation in some cases. Resection and anastomosis was done in 17 (10.96%) patient in case of multiple perforations without shock, anaemia and chest infection as it is a time consuming procedure which should not be done in critically ill patients. The best procedure to avoid mortality of serious patients Ileostomy which we have done in 21 (13.54%) patients presenting with septic shock, chest infection with anaemia.^{33, 34} No mortality was noted in these patients but it had its own disadvantage of peristomal ulceration, malnutrition, patient feels isolated due to faecal soilage and needs of second operation for ileostomy closure, but it is life saving procedure.

In our set up we commonly use Ceftriaxone, Metronidazole, and Amikacin but recently we noticed resistance to Ceftriaxone, and sensitivity to Meropenem /Imipenem but unfortunately these drugs are not available here.

The overall complication rate is high.^{13,15,18,19,20,21} The possible causes of high complication rates in our setup are late presentation in hospital with associated complication, limited resources like, lack of higher antibiotics, free blood bank facility, total parenteral nutrition, Intensive care unit. The most common complication is the surgical site infection; the possible cause of this infection may be contamination of wound during laparotomy.^{18,23,25}

The overall median stay of patient in hospital is raised; this can be explained by the higher rate of complication.¹⁸ The mortality rate in our study is higher than the average mortality rate of India 10.5%³⁴ but it is much in Africa which is 22%, very low mortality rate 1 – 2% has been reported in developed world, where infrastructure is well developed.

In our present study only 90.32 % (140 patients) were available for follow up after one week but follow up after 3 month was only 12.90% (20 patients). The cause of poor follow up in this area is poverty, poor transport.

This study highlighted our experience in management of typhoid intestinal perforation in a resource limited setting in rural central India and provided local data to guide health care providers for effective management. The difficulties identified in the management of these patients in our setting need to be addressed, in order to deliver optimal care for these patients and improve our treatment outcome.

5. Conclusion

Enteric fever is an endemic in India with high perforation rate with associated high morbidity and mortality. Early and appropriate surgical intervention, safe anaesthesia, effective peri-operative and postoperative care and delivery of wide spectrum antibiotics with low resistance are highly recommended for the management of typhoid intestinal perforation in this region. Ileostomy is best operative procedure when life saving is considered, so we advocate this technique for intestinal perforations. Emphasis should be given on preventive measure such as providing safe drinking water and appropriate sewage disposal, typhoid vaccination, improving medical facility and programme for improving public health awareness in remote areas.

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