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Original Research Article

Typhoid ileal perforation: a two-year study at a tertiary care hospital of South India

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ABSTRACT

Background: Typhoid fever is an acute febrile illness caused by gram negative bacilli, *Salmonella enteritidis* serovars typhi. The incidence of typhoid fever varies globally from 140 episodes per 10000-person years in Kolkata to 273 per 10000 in Delhi, India. The present study was done with an aim to assess the risk factors, complications and different surgical techniques in cases of typhoid ileal perforation. The study also identifies and focuses on the post-operative complications in cases of perforation due to typhoid fever.
Methods: A prospective study was conducted for a period of two years from June 2105 to May 2017 at a tertiary care hospital on all the cases admitted and operated for typhoid perforation. The data collected was analyzed using SPSS version 15.0 for windows 7.
Results: 104 cases with an incidence rate of 8.4% of perforation were included in the study. Males were majority and mean age of the study group was 21.8±10.1 years. The peak incidence of study group was 31-40 years and >60 years. Fever and abdominal pain (rebound tenderness) was the common sign and symptoms. Free fluid and air collection under the diaphragm was the commonest finding in radiographs and ultrasound. Majority of the cases had single perforation (84.62%) and ileum was the most common site of perforation (84.62%). Simple closure with double layering was the commonest surgical procedure performed and the incidence of post-operative complication was 36.5%. Overall mortality in the study was 3.8%. SSI was the commonest post-operative complication.
Conclusions: To conclude from our study, typhoid still remains as an endemic disease in spite of improved awareness and better sanitation facilities. Inadequate treatment, misdiagnosis and mismanagement of cases by non-medical practitioners at rural settings may increase the risk of complications.

Keywords: Perforation, *Salmonella typhi*, Surgical site infection, Typhoid fever

INTRODUCTION

Typhoid fever is an acute febrile illness caused by gram negative bacilli, Salmonella enteritidis serovars typhi.[1] Its distribution is global and has been eliminated in many developed countries by improved sanitation and well-practiced hygienic practices. Our country still continues to be an endemic zone for typhoid fever because of poorly developed sanitation facilities, lack of potable drinking water and poor hygienic practices by the people. The incidence of typhoid fever varies globally from 140 episodes per 10000-person years in Kolkata to 273 per 10000 in Delhi.[2] Intestinal perforation is one of the serious surgical complications observed in developing countries and associated with significant morbidity and mortality. The rates of perforations vary from 0.8% to

1.8% in various studies conducted globally.[3] Despite high morbidity and mortality little is known about the risk factors, outcomes and predictors of typhoid intestinal perforation. Most of the studies have confined to the etiology of hollow viscus perforation and correlated with typhoid ileal perforation.[4]

With increased usage of antibiotics, dramatic change in the clinical course of the disease and outcome, complications and deaths due to related complications have decreased. Evaluation of the cases of the typhoid and its complications need to be carried out periodically and reevaluation is needed in cases with perforation.5 Typhoid perforation most commonly occurs in the second week of illness and ileum is the commonest site of perforation.

These perforations are mostly due to necrosis of payer's patches in the terminal ileum. It's a challenging emergency in developing countries and resulting peritonitis can be fatal and associated with morbidity and mortality unless surgical intervention is done immediately. The surgical management of typhoid perforations re variable and range from simple closure to ileostomy depending upon the number of perforations, size of perforation and general status of the patient.

Despite advances in the surgical techniques and antibiotic prophylaxis post-operative complications are associated which may be wound infection, enterocutaneous fistula, wound dehiscence and intra-abdominal abscess.[6]

The present study was done with an aim to assess the risk factors, complications and different surgical techniques in cases of typhoid ileal perforation. The study also identifies and focuses on the post-operative complications in cases of perforation due to typhoid fever.

METHODS

A prospective study was conducted by Department of general surgery for a period of 2 years from June 2105 to May 2017 at a tertiary care hospital. The study included all the cases of acute abdomen attending the IPD and OPD of General surgery with findings suspicious of perforation. The demographic data of the cases was collected in a standardized data collection form which includes age, sex, smoking, alcohol consumption, previous H/O typhoid, educational status etc.

Clinical examination was done by surgeon and History which include duration of fever, history of antibiotic administration, duration between admission and surgery, clinical signs and symptoms were noted for all the cases. Laboratory investigations for typhoid which include serological Widal test, and isolation of *S. typhi* from blood, urine, stool by culture, and for perforation a plain abdominal and chest radiography for detection air under the diaphragm and free fluid levels in the abdomen, abdominal ultrasound and other general investigations like Complete blood picture. All the patients were informed about the study and written informed consent was obtained from them who were willing to participate in the study. Patients willing for study were evaluated by Anesthetist and had pre-operative assessment. The study was approved by the institutional ethical committee and the study was done as per the protocol of the ethical committee. All the cases willing for the study and who had pre-operative anesthetist assessment were posted for surgery and underwent exploratory Laparotomy. Perforations were surgically treated based on the number of perforations, site of perforation and general health status and level of faecal contamination.

The excised specimens were sent for histopathological examination. A simple double layered closure was performed in cases with single perforation. Patients with multiple perforations had bowel resection and anastomosis. The post-operative outcome was monitored and development of complications in the cases were noted and followed up. Length of hospital stay, and mortality of the cases were noted.

Inclusion criteria

- Cases above 10 years of age.
- All cases of acute abdomen suspected with ileal perforation due to typhoid fever.
- Patients willing to participate in the study.

Exclusion criteria

- Patients less than 10 years of age.
- Perforation at sites other than ileum.
- Cases not consenting for the study.

Statistical analysis

The statistical analysis was performed using SPSS version 15.0 for windows 7. The mean±standard deviation (SD), median and ranges were calculated for continuous variables and proportions and frequency tables were used for categorical variables. The level of significance was considered if P value <0.05.

RESULTS

The present study was conducted by the department of general surgery for a study period of two years. A total of 1218 patients presented with acute abdomen during study period and 104 patients who fulfilled the inclusion criteria were selected for the study. The rate of ileal perforations due to typhoid fever was around 8.4% in present study.

Socio demographic characters

In the present study, 63 cases (60.58%) were males and 41 (39.42%) were females with male to female ratio of 1.5:1. Their age ranges from 12-72 years with a mean±

SD of 21.8±10.1years. The mean age of the males was 23.6 years and females 26.32 years.

The peak incidence of the cases in the study was 31-40 years and >60 years (21.15%). In females the peak age incidence was 31-40 years and in males >60 years (13.46%). Majority of the cases were illiterate (52.88%) and from rural area (51.92%). 55.57% were smokers and 64.42% were alcoholics. 17.31% gave a previous history of typhoid fever (Table-1)

Clinical signs and symptoms of patients with typhoid intestinal perforation.

Table 1: Demographic characters of cases in the study.

Age distribution (Years)	Male	Female	Total
	No (%)	No (%)	
10-20	7 (6.73)	5 (4.81)	12 (11.54)
21-30	11 (10.58)	7 (6.73)	18 (17.31)
31-40	13 (12.5)	9 (8.65)	22 (21.15)
41-50	12 (11.54)	7 (6.73)	19 (18.27)
51-60	6 (5.77)	5 (4.81)	11(10.58)
>61 years	14 (13.46)	8 (7.69)	22 (21.15)
Total	63 (60.58)	41 (39.42)	104
Education			
Literate	34 (32.69)	15 (14.42)	49 (47.12)
Illiterate	29 (27.88)	26 (25)	55 (52.88)
Place of Living			
Rural	41 (39.42)	23 (22.12)	54 (51.92)
Urban	22 (21.15)	18 (17.31)	50 (48.08)
Smoking			
Yes	44(42.31)	2(1.92)	46 (44.23)
No	19 (18.27)	39(37.50)	58 (55.77)
Alcohol			
Yes	32 (30.77)	5 (4.81)	37(35.58)
No	31 (29.81)	36 (34.62)	67 (64.42)
Previous History of Typhoid			
Yes	12 (11.54)	6 (5.77)	18 (17.31)
No	8 (7.69)	12(11.54)	20 (19.23)
Unknown	43 (41.35)	23(22.12)	66 (63.46)

84 cases (80.8%) had symptoms with <2 weeks with mean duration of 6.12 days and 20 cases (19.2%) with > 2 weeks and mean duration was 16.12 days. Fever was observed in all the cases (100%) followed by vomiting, abdominal pain (85%) and next diarrhoea (63.4%), constipation (26.9%). Rebound tenderness was the commonest sign of perforation (84.6%), followed in order by abdominal distension (80.7%), dehydration (75%), and shock (65.4%).

Hepato-splenomegaly was observed in 21.1% of cases. In all the cases perforation occurred prior hospitalization and duration of perforation- admission interval was < 24 hours in 90 cases (86.54%), 25-72 hours in 8 cases (7.69%) and > 72 hours in 6 cases (5.77%) History of prior antibiotic administration was observed in 86 cases (82.7%) and no history in 18 cases (17.3%) (Table-2).

Table-2: Signs and Symptoms of cases in the study.

Duration	Number	%
< 2 weeks	84	80.8
> 2 weeks	20	19.2
Symptoms of Typhoid		
Fever (>38.3^{0}C)	104	100.0
Abdominal pain	89	85.6
Vomiting	88	84.6
Diarrhoea	66	63.4
Constipation	28	26.9
Signs of Perforation		
Hepatosplenomegaly	22	21.1
Abdominal Distension	84	80.7
Rebound tenderness	88	84.6
Dehydration	78	75.0
Shock	68	65.4
Confusion	49	47.1
Perforation-admission interval (hours)		
<24 hours	90	86.54
25-72 hours	8	7.69
72 hours	6	5.77
Previous history of antibiotic administration		
Yes	86	82.7
No	18	17.3

Investigations

In 78 cases (75%) *S.typhi* was isolated, from blood (68), urine (4) and stool (6) and widal with significant titre (titre ≥1 in 160 dilutions for 'O' and 'H' antigen) were found in 86 cases (82.7%). Plain X ray abdomen with free air collection (pneumoperitoneum) was demonstrated in 84 cases (80.7%) and ultrasound abdomen with free peritoneal collections in 68 cases (65.4%).

Leucopenia was observed in 100% of cases and elevated transaminases in 54% of cases. Histopathological examination of excised specimens from edges of the perforations demonstrated typical inflammatory reaction with Monocytes, lymphocytes and plasma cells in 97% of cases.

Perforations and surgical procedures

All the patients diagnosed with perforations clinically and radiologically were subjected to exploratory Laparotomy. The perforation surgery interval was < 24 hours in all the cases with mean time of 6.12 hours.

Heavy contamination of the peritoneal cavity was observed in 22 cases (21.1%) with generalized peritonitis and 82 cases with minimal contamination (78.8%). 88 cases (84.62%) of cases had single perforation, 12 cases with double perforation (11.54%) and 6 cases (5.77%) with multiple perforations. The mean age of the cases

with single perforation was 48.12 years and was significantly higher than those cases with multiple perforations (Mean age: 22.10 years) (P value <0.05). Ileum was the commonest site of perforation identified in 88 cases (84.62%) and followed in order by jejunum (9.62%), caecum, ascending colon and appendix in 2 cases each (1.92%).

The median size of perforation was 6.8 mm (2.5 – 23 mm) (Table-3).

Table-3: Site of perforation and number of perforations among the cases in the study.

Site of perforation	Number	%
Ileum	88	84.62
Jejunum	10	9.62
Caecum	2	1.92
Appendix	2	1.92
Ascending Colon	2	1.92
Number of perforation		
1	86	82.69
2	12	11.54
>3	6	5.77

The commonest surgical procedure performed was simple closure of the perforation with double layering after excision of the edges in 78 cases (75%) followed in order by bowel resection anastomosis (13.46%), hemicolectomy and appendicectomy in 5.77% of cases (Table-4).

Table 4: Type of surgical procedure performed.

Surgical procedure performed	Number	%
Simple double layered suture	78	75
Bowel resection anastomosis	14	13.46
Hemicolectomy + Ileo transverse anastomosis	6	5.77
Appendicectomy	6	5.77

Follow up with Post-operative complications

38 cases (36.5%) of cases developed a total of 58 post-operative complications in the study.

Surgical site infection was the commonest of all observed in 41.38% of cases followed by less common which include chest infection, wound dehiscence, Intra-abdominal abcess and renal failure.

Late complications include incisional hernia in 6.9% of cases and adhesive intestinal obstruction in 5.17% of cases.

The overall length of hospital stays in present study ranged from 10 days to 38 days with a median of 18 days. The mortality rate in present study was only 3.8%. Patients who developed post-operative complications had more length of hospital stay and was found statistically significant. (P value <0.05) (Table-5).

Table 5: Post-operative complications among the cases in the study (N=58).

Post-operative complications	Type	Number	%
Early	Surgical site infection	24	41.38
	Chest infection	8	13.79
	Septic shock	2	3.45
	Intra-abdominal abscess	6	10.34
	Enterocutaneous fistula	4	6.90
	Wound dehisence	8	13.79
	Renal failure	1	1.72
Late	Incisional hernia	4	6.90
	Adhesive intestinal obstruction	3	5.17

DISCUSSION

Typhoid fever continues to be an endemic disease in developing countries with intestinal perforation a serious complication in untreated and neglected cases. With better availability of antibiotics, improved surgical techniques the mortality in perforated cases has been reduced and offers a good chance of survival. The incidence rates of typhoid perforation are variable throughout the world and they represent the endemicity of the disease in any locality.

In present study the incidence of perforation was 8.4% which is significantly higher than developed countries and lower than countries of Africa where the range was around 10-30%. This is clearly explained by well-developed sanitation and hygienic practices in developed and poor facilities in developing countries. The variability of incidence rates of perforation from region to region of the same country may be difference in the virulence of Salmonella typhi and increased hypersensitivity reaction in payers patches.

In the present study, the incidence of perforation was more commonly observed in second and third decades of life which is as par with the reports of many studies elsewhere.[7,8] High incidences of disease and perforation in this age group may be due to increased unhygienic food practices and consumption of food outside. This age group is the productive age group and causes an important economic loss to the family and the nation. In present study the rate of intestinal perforation is more commonly observed in males than females as observed in many studies. Other factors observed were perforation

was more commonly observed in people who were illiterate, from low socio-economic status and from rural areas. These findings of present study coincide with studies done elsewhere and, in the findings, reported by CDC every year.[9] People of low socio-economic status and illiterates first approach the quacks where they are misguided and improperly treated which leads to more complications.

The clinical presentation of typhoid fever in present study was almost similar and no differences were observed from those observed in other geographical areas. In present study, most of the patients who had perforation were inadequately treated for malaria by unqualified healthcare providers and were not done any investigations.

The place of study being a tertiary care hospital, all the cases of study developed perforation prior hospitalization and were referred from primary and secondary health care settings. History of inadequate treatment was observed in majority of the cases and in majority of cases who developed perforations, a low PCV value was observed suggesting anemia may be a risk factor in development of perforation. These findings were similarly reported by Sharma A et al.[10]

In present study it was observed perforation was observed mostly in the second week of illness in 68% of cases indicating improper treatment may lessen the time period in development of peritonitis. Other contributory factors which may reduce the duration include low immune status, virulence of the organism and hypersensitivity of payer's patches and the ileal contents of bacteria.[11] our observation majority of the cases developed generalized peritonitis with minimal contamination. 84% of cases in present study had single perforation and ileum was the most common site as reported by many studies locally and globally. However, few studies from West Africa reported multiple perforations as more common in their study and ileum as the most common site of perforation.[12, 13]

In agreement with many other studies, the diagnosis of perforation and typhoid fever as a cause was established by clinical evaluation, laboratory investigations with blood, urine and stool culture for Salmonella typhi, identification of free air under the diaphragm on chest and abdominal radiographs.

Findings of present study demonstrated free gas under the diaphragm in 81% of cases which is consistent with many other studies.[14] In the present study we found that ultrasound abdomen is superior than plain radiograph in identification of free fluid collections and air in abdomen.

Surgical treatment was the only management performed in present study. The time interval between admission and surgery was <24 hours in all the cases and time between perforation and admission was <24 hours in 90 cases. Early intervention reduces the chance of post-operative complications and delayed surgery increases chances of septic shock and severe peritonitis as observed in many studies. In resource poor countries, delayed in diagnosis, patient transfer and inadequate antibiotic treatment may result in delayed presentation to the hospital.[15]

The presence of single perforation as a majority finding is consistent with many other studies and the most common surgical procedure performed was simple double layered suturing as done in many settings. In cases with multiple perforations the surgical procedure was different and segmental resection with primary anastomosis was performed and in few cases with caecum involvement right hemicolectomy was performed.

The median age of the patients with single perforation was significantly higher than cases with multiple perforations in present study. These findings were contrary with findings of many studies who reported that multiple perforations occurred at higher age than at lesser age observed in present study. Beniwal et al reported that number of perforations had a significant effect on surgical outcome and had bad prognosis in his study.[16]

The overall rate of post-operative complications in present study was 56% which is significantly higher than many reports from developed countries and on par with studies from developing countries. The difference in complication rates may be explained by differences in antibiotic coverage, type of surgeries performed, meticulous preoperative and post-operative care, improved anesthesia and hospital care. As stated in many studies, surgical site infection was the commonest complication observed in present study and was most common in cases with multiple perforations. This finding of present study was consistent with reports of other studies. [17] The mortality rate in present study was only 3.8% and is lower than many reports from developing countries where it is reported from 9-22%. Less rates of mortality in present study may be due to improved hospital care, better surgical technique and well developed infra structure.

CONCLUSION

To conclude from present study, typhoid still remains as an endemic disease in spite of improved awareness and better sanitation facilities. Inadequate treatment, misdiagnosis and mismanagement of cases by non-medical practitioners at rural settings may increase the risk of complications.

Bringing awareness about the disease, its complications and controlling quackery and malpractices may reduce the risk of complications. With increase in the awareness of available vaccinations for typhoid and inclusion in immunization schedule may bring a drastic reduction in the incidence of the disease. This awareness can be

spread by national programmes which are still lacking in India.

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