Scholars Journal of Applied Medical Sciences (SJAMS) **ISSN 2320-6691 (Online)**
Sch. J. App. Med. Sci., 2016; 4(9E):3481-3486 **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2016.v04i09.064

Original Research Article

Morbidity and mortality of typhoid perforation of small bowel

Dr. Shanti Santhosh Kumar[1], Dr. Ramu Kamatala[2]
[1]Assistant Professor in Department of general surgery, RVM Institute of Medical Sciences, Mulugu, Medak, Telangana
[2]Associate Professor in Dept of general surgery, RVM Institute of Medical Sciences, Mulugu, medak, Telangana

***Corresponding author**
Dr. Shanti Santhosh Kumar
Email: santhosh_surgery@yahoo.co.in

Abstract: Typhoid fever remains a public health problem in the developing world with gut perforation the major complication. Typhoid ileal perforation, even though is a rare complication of enteric fever is often associated with a significantly high morbidity and mortality.to know the various factors affecting the prognosis of the patient and the morbidity and mortality of typhoid perforation of small bowel in typhoid fever the present study conducted in Gandhi hospital Hyderabad in the period of October 2004 to October 2006 over 35 patients. Most of the patients were seen in between second and third decade of life with male preponderance (M 4:1 F). There were 29 single perforations and 6 multiple perforations.26 perforations were located within 30cm of ileo-caecal junction. Fourteen patients were operated within 24hrs of presentation with the morbidity of 50% and no mortality was seen.
Keywords: Typhoid fever, perforation. Ileum, surgical closure.

INTRODUCTION

Typhoid fever is a unique human systemic infection caused by Salmonella typhi; with perforation of the bowel is the most serious complication of typhoid fever, usually occurs during the third week of clinical illness. Salmonella typhi is a gram negative, non sporing motile bacillus, carry a complex antigenic structure. Three important antigens are , 'O' or somatic antigen ,'H' or flagellar antigen,'V' or virulence antigen.'O' and 'H' antigens are used in the characterization of the organism and antibodies to them are used in the serodiagnosis of typhoid fever.

PATHOGENISIS

Nearly always infection with Salmonella typhi is caused by the ingestion of infected food or water. Infection occurs only if atleast 10^3 typhoid bacilli are ingested. Bacteria successfully evading 'acid death' in the stomach pass on to the distal ileum and colon, where they penetrate the mucosal barrier. Initial bacterial invasion results in transient asymptomatic bacteremia as organisms are rapidly ingested by mono nuclear phagocytes with in which they survive and multiply enough to permit the initiation of persistent bacteremia , the clinical phase of typhoid fever begins with invasion of the gall bladder and Payer's patches of the intestine. Payer's plaques, the lymphatic centers parallel to the longitudinal axis of the sites where bacterial toxins cause necrosis and perforation via capillary thrombosis of the affected bowel [1]. It has been postulated that much of the damage done may be due to the body's response to the organism, the mono nuclear cell response is characteristic of delayed hypersensitivity [2].

TYPHOID LESIONS OF INTESTINE

The characteristic lesions are seen in the lower portion of the ileum. The jejunum, colon and appendix may also be infected. Early in the course of the disease, Payer's patches and the solitary lymph follicles in the region of the caecum become hyperaemic and hyperplasic to produce almost ' *button-like* ` protrusions. This change persists into second week at which time necrosis of the lymphoid tissue occurs. The central necrotic tissue sloughs away leaving an ulcer. Long oval ulcers in the ileum parallel to the long axis of the bowel and correspond in shape and arrangement to Payer's patches. The ulcer may extend deep into the sub mucosa or through the muscle coat. Perforation occurs when the ulceration is deep and extends through the muscle coat, usually during the 3rd week. *Perforation occurs classically on the antimesenteric border of terminal ileum.* In about 20% of cases multiple perforations are present. Caecal perforation can also occur but is far less common. Healing occurs with granulation tissue, replacement of debris followed by

regeneration of the epithelium over the surface. Scarring with stricture formation is extremely rare.

Perforation of the bowel is the most serious complication of typhoid fever and usually occurs during the third week or clinical illness. The incidence of bowel perforation varies markedly from place to place, varying from 0.88% [3] to 17.9% [4]. Van Basten reviewed 66157 patients with typhoid in the world literature and reported an overall 3% perforation rate [5]. The disease has a definite seasonal incidence peaking at times of heavy rainfall, when water contamination is more likely [2]. Hallmark features of the typhoid arc fever (38.8° C to 40.5° C) in 75% of the cases and pain abdomen in 20-40% of cases which are variable. After a brief period of continuous fever usually more than one week the diagnosis of perforation is suggested by increasing abdominal pain often beginning in the right iliac fossa or lower abdomen and spreading from there associated with nausea and vomiting. Tachycardia replaces the usual slow pulse rate of typhoid.

The most useful clinical signs are tenderness, rigidity, guarding and loss of liver dullness. The first signs may be the appearance of the free fluid in the peritoneal cavity, the disappearance of bowel sounds and vomiting [4] Classical signs may be absent in those who are very toxic und repeated abdominal examination [4, 2].

*Points in Diagnosis of perforation or small bowel:

1. Increasing abdominal pain in the course of typhoid fever.
2. Signs of peritonitis with typhoid fever.
3. Loss of liver dullness with sub diaphragmatic air on X-ray.
4. Appearance of free fluid in the peritoneal cavity with absent bowel sounds and vomiting.

DIAGNOSIS OF TYPHOID PERFORATION

Typhoid perforation should be considered if an acute abdomen develops in a patient with fever for a long time [1-3 weeks [6] to average length of history being 8-11 days of Gibney [2].

Abdominal pain and abdominal wall muscle rigidity still remain as the most outstanding of all symptoms in typhoid perforation [1]. Broadly speaking, it was assumed that patients with headache, high fever of a few days' duration and associated abdominal symptoms of intestinal perforation were cases of typhoid perforations, even if supportive investigations were not always recorded to confirm the diagnosis [3].

In an endemic area of typhoid fever, the diagnosis of typhoid perforation should be made on physical examination [5]. Most clinical difficulty arises in patients known or considered to have typhoid who have abdominal symptoms but equivocal signs and no free sub diaphragmatic gas on X-ray [5].

Investigations:

1. Plain X-ray abdomen: Pneumoperitoneum - is an important sign on plain abdominal radiograph. The accuracy of this sign is - 60-80% [7], 66.9% Kayabali to 82% [1, 7].
2. Blood cultures are positive for salmonella in only 3%-34% of cases of typhoid perforation [8]. Blood cultures me positive in approximately 90% of cases in the first week of fever, 75% of cases in the second week of fever and 60% in the third week. Blood cultures rapidly become negative on treatment with antibiotics [9].
3. Widal test positive 38 %(Santillana) to 70.1 % [3].The result of 'the Widal test should be interpreted taking into account the following:
4. Agglutinins usually appear by the end of the first week so that blood taken earlier may give a negative result. The titre increases steadily till the third or fourth week after which it declines gradually.
5. Titres of I /100 or more for 'O' agglutinins and 1/200 or more for 'H'agglutinins are significant.
6. Cases treated early with chloramphenicol may show a poor aggulutinin response.
7. Persons who have previous infection or immunization may develop an anamnestic response during an unrelated fever.
8. Demonstration of a rise in titre of antibodies by testing two or more serum samples is more meaningful than a single test [9].
9. Although serologic and bacteriologic data may be supportive they are frequently negative [8]

AIIMS OF THE STUDY

- To study the morbidity and mortality of typhoid perforation of small bowel.
- To study the various factors affecting the prognosis of the patient.

MATERIALS AND METHODS

Thirty five consecutive patients clinically diagnosed as having typhoid perforation of small bowel were seen between October 2004 and October 2006 in Gandhi Hospital, Hyderabad. All the age groups from 10yrs to 55yrs and both males and females were included in this study.

In making the diagnosis and deciding the criteria for inclusion in the study, great emphasis has been given to clinical symptoms and signs; fever abdominal pain and the signs of abdominal tenderness, guarding,

rigidity, distension of abdomen, absent bowel sounds, free fluid in the abdomen, and obliteration of liver dullness were considered most important.

STATISTICAL ANALYSIS:

Since there was no comparative group in the study, results were expressed as ratios and percentages.

RESULTS

NO. OF PATIENTS : 35

AGE AND SEX

GROUP	MALE	FEMALE	TOTAL	%
<10 Years	2	-	2	5.72
11-20 Years	9	2	11	31.43
21-30 Years	10	2	12	34.28
31-40 Years	5	2	7	20
>40 Years	2	1	3	8.57

Most of the patients were seen in between second and third decade of life with male preponderance (M 4:1 F)

Fever before pain abdomen

Duration	**No.Of Patients**	**%**	**Morbidity rate**	**Mortality rate**
< 1 week	3	8.57	3 (100%)	-
1-2 weeks	10	28.57	5 (50%)	-
2-3 weeks	13	37.14	8 (61.5%)	3 (23%)
Same duration of fever & pain abdomen	5	14.28	4 (80%)	1 (20%)
No fever	4	11.12	3 (75%)	-

Most of the patients were seen in between second and third week of illness (65.7%)

Symptoms:

Symptoms	**No of patients**	**Percentage %**
Pain abdomen	35	100
Fever	31	88.5
Distention of abdomen	16	45.7
Vomitings	19	54.2
Constipation	08	22.8
Loose motions	03	8.5
Hematemisis	02	5.7
Malena	04	11.4

Abdominal pain and fever were the most common symptoms.

Presentation:

	No.of patients	%	Morbidity rate	Mortality rate
Febrile / Toxic	23	65.71	14 (60.86)	3 (13.04)
Afebrile	12	34.28	9 (75)	1 (8.3)

23 patients were presented in a toxic state and had more morbidity and mortality.

Signs of Peritonitis

Signs of Peritonitis	No. of patients	%	Morbidity rate	Mortality rate
Generalised	25	71.42	16 (64)	4(16.6)
Localised	10	28.57	7(70)	-

Patients presented with generalized peritonitis had high mortality rate but the morbidity rates were similar in both the groups.

Pneumoperitoneum- present in 23 patients (65.71%)

Widal test positive in 12 patients (34.28%)

PERFORATION

There were 29 single perforations and 6 multiple perforations.26 perforations were located within 30cm of ileo-caecal junction.

	No.of patients	%	Morbidity rate	Mortality rate
Single perforation	29	82.85	23 (79.31)	3 (10.34)
Multiple perforations	6	17.14	4 (66.66)	1 (16.66)

PERFORATION SITE (SINGLE)-DISTANCE FROM ILEOCAECAL JUNCTION

Site	No of patients	%	Morbidity	Mortality
0-15	15	51.72	10(66.66)	2(13.33)
16-30	11	37.93	7(63.33)	1(9.09)
31-45	-	-	-	-
>45cm	3	10.34	3(100)	-

The closest perforation was 2cm from the ileal junction. The farthest was 60cm from the ileo caecal junction. The closer the site of perforation to the ileocaecal junction had more mortality and morbidity rates.

SIZE OF THE PERFORATION (SINGLE)

Size	No of patients	%	Morbidity	Mortality
<0.5 cm	13	44.82	9(69.23)	1 (7.6)
>0.5 cm	16	55.77	12(75.00)	2(12.5)

Size of the perforation varies from 0.2cm to 2.5cm and an average size of 0.6cm. 55% of the perforations were more than 0.5 cm had high morbidity and mortality rates.

PERITONEAL FLUID:

Type	No Of Patients	%	Morbidity	Mortality
Bilious	7	20	4(57.14)	1(14.28)
Feculent	12	34.28	8(66.6)	2(16.66)
Purulent	16	45.71	12(75.0)	1(6.25)

Amount of free peritoneal fluid was between 50cc to 3000cc, type of fluid was bilious, feculent or purulent with an average of 1100cc.

AMOUNT OF PERITONEAL FLUID:

Amount	No Of Patients (%)	Morbidity rate	Mortality rate	Faecal a
<1 litre	21 (60%)	14(66.66)	1(4.76)	2(9.50)
>1 litre	14(40%)	10(71.42)	3(21.42)	5(35.7)

Patients with more than one litre of peritoneal fluid had more morbidity and mortality.

PERITONTIS – OPERATION TIME INTERVAL

Complication	<24hrs (14 pts)	>24hrs(21pts)	Total(35)
Wound infection	6	12	18.(51.42)
Wound dehiscence	-	4	4(11.42)
Residual abscess	-	3	3(8.57)
Feacal fistula	1	6	7(20.00)`
Mortality	-	4	4(11.42)

Fourteen patients were operated within 24hrs of presentation with the morbidity of 50% and no mortality was seen. Twenty one patients were operated after 24hrs of their presentation with the morbidity of 76% and mortality of 19%.Patients who presented late had more morbidity and mortality. Patients presented early had low morbidity rates and no mortality seen. Peritonitis-Operation time interval is the single most important prognostic factor as similar to other studies.

MANAGEMENT

Complication	Primary closure26 (68.57)	Resection and end to end anastomosis6(17.14)	Exteriorization of the bowel (closed perforation 2(5.71)	Exteriorization of the perforated ileum 1(2.85)	Ileotranseverse Anastomosis 1(2.85)	Peritoneal drainage followed by simple closure 1(2.85)
Wound infection	13	2	-	1	1	1
Wound dehiscence	2	1	1	-	-	-
Residual intra-abdominal abscess	1	2	-	-	-	-
Feacal fistula	2	3	2	-	-	-
Mortality	2	2	-	-	-	-

COMPLICATIONS:

Complication	No of patients	%
Wound infection	18	51.42
Wound dehiscence	4	11.42
Residual intra-abdominal abscess	3	8.57
Faecal fistula	7	20.00
Death	4	11.42

Wound infection, Wound dehiscence and residual intra-abdominal abscess were more with primary closure; whereas faecal fistula and mortality rates were more with resection and end to end anastomosis. Faecal fistula was seen in seven patients, six were presented late>24hrs duration, had multiple

perforation and gross contamination of peritoneal cavity. Out of which 3 patients were died and other four patients were treated with conservative treatment.

Four patients died, Out of which three patients had feacal fistula and two patients had septicemia. All four patients died 10 days after surgery.

Other complication:

Complication	No of patients (%)
Pulmonary complication	10 (28.57)
Prolonged ileus	2 (5.71)
Thrombophlebitis	1 (2.85)
Bed sores	2 (5.71)

HISTOPATHOLOGIAL EXAMINATION:

Histopathological examination of li leal tissue from the perforation site showed findings were consistent with typhoid perforation in fifteen patients (42%).

HOSPITAL STAY:

Minimum hospital stay was 7 days without any complication and maximum hospital stay was 59 days with complication, and an average hospital stay was 24.85 days

DISCUSSION

AGE INCIDENCE

A total of 35 patients were included in this study. The youngest patient was 10 years old and the oldest was 55 years. The mean age of patients included in this study was 24.9 years, compared to the study by Adesunkanmi (1997) [10], where the mean age was 19.5 years.

GENDER

The male to female ratio in our study was 4:1; similar to the Adesunkanmi study, with preponderance among males [10].

DURATION OF SYMPTOMS

The duration of symptoms ranged from 1 day to 30 days with a mean of 10.5 days; compared to the study by Adesunkanmi[(10)] where the duration of symptoms ranged from 4 to 28 days with a mean of 11 .3 days. Twenty two patients (62.85 %) presented within 2 weeks of symptoms with a morbidity of 59 % (13 out of 22) and with a mortality of 4.5 % (1 out of 22); while 13 patients (37.14%) presented after 2 weeks of symptoms with a morbidity of 61.5% (8 out of 13) and with a mortality of 23% (3 out of 13) compared to the study by Adesunkanmi[(10)], where 41 patients (82%) presented within 2 weeks of symptoms with a mortality of 24% (10 out of 41 patients) while 9 patients (18%) presented after 2 weeks of symptoms with a mortality or 44.4%.

Duration of illness	Mortality %	
	Present study	**Adesunkanmi study[10]**
Within 2 weeks	4.5%(1/22pts)	24.0% (l0/41pts)
After 2 weeks	23%(3/13pts)	44.4% (4/9pts)

Fourteen patients were operated within 24 hours, while 21 patients were operated upon after 24 hours. The delay was caused by the late presentation of patient to the hospital and by the need for adequate resuscitation before operation. Thirty three out of 35 patients abdomen was opened by midline incision. 2 patients were opened by right paramedian incision.

There were single perforations in 29 patients with a morbidity rates of 79.3% (23 out of 29 patients) and with a mortality rate of 6.89 (2 out of 29 patients) and multiple perforations in 6 patients (17%) with a morbidity rate of 66.6% (4 out of 6 patients) and with a mortality rate of 33.3 (2 out of 6 patients) compared to the study by Adesunkanmi[(10)] where there were single perforations in 43 patients (86%) with a mortality rate of 16.7% and multiple perforations seen in 7 patients (l4%) with a mortality rate of 100% .

No. Of perforations	Mortality %	
	Present study	**Adesunkanmi study[10]**
Single perforations	6.89 (2/29 patients)	16.7% (7/43 patients)
Multiple perforations	33.3 (2/6 patients)	100% (14/14 patients)

Out of 29 patients with single perforation, 15 perforations (51.72%) were located within 15 cm from ileo-caecal junction and 16 perforations were greater than 0.5 cm in diameter with a morbidity of 75% and with a mortality of 12.5%.

The amount of pus/fecal matter drained from the peritoneal cavity reflected the extent of contamination. The drainage was between 50 mI to 3000 mI. In 21 patients (60.0%) with less than 1 litre of peritoneal fluid - morbidity rate of 66.66% and with a mortality rate of 4.76% and with a fecal fistula rate of 9.52%.

In 14 patients drained more than 1 litre with morbidity rate of 71.42%, mortality rate of 14.2% and with a faecal fistula rate of 35.4%.More the peritoneal contamination, more the morbidity and mortality rates, similar to the findings of Adesunkanmi [10].

Surgical management consisted of primary simple closure of the perforation (68 %); resection and end to end anastomosis (17.14%) exteriorization of the closed perforated bowel (5.71 %); exteriorisation of the perforated ileum (2.85%), primary closure and ileotransverse anastomosis (2.85%) and peritoneal drainage followed by two layer closure (2.85 %).

Wound infection, wound dehiscence and intra-abdominal residual abscess rates were more with primary closure; whereas faecal fistula and mortality rates were more with resection and end to end anastomosis. Primary closure of perforation with or without an omental patch has been most successful operation for typhoid perforation of small bowel similar to other studies [10].

The post-operative complications recorded were, wound infection in 18 patients (51.42%); wound dehiscence in 4 patients (11.42 %); residual intra-abdominal abscess in 3 patients (8.57%); faecal fistula in 7 patients (20.0%) and 4 patients died (11.42%) as compared to the study by Adesunkanmi [10] where the complication rates were, wound infection 66%; wound dehiscence 34%; residual intra-abdominal abscess 8%; faecal fistula 8% and mortality rate 28% .

Complications	**Present study %**	**Adesunkanmi % [10]**	**Talwar S study % [11]**
Wound infection	51.42	66	79.1
Faecal fistula	20	8	10
Mortality	11.42	28	16.4
Wound dehiscence	11.42	8	-
Residual intraabdominal abscess	8.57	8	-

Talwar S from Ajmer [11] India reported the complications from his study were wound infection 79.1 %; faecal fistula 10% and mortality rate 16.4%. Faecal fistula adversely affected the Mortality rate. Mortality was 75% in those with faecal fistula; similar to the study by Adesunkanmi [10] (Nigeria) and Talwar S (Ajmer). Survivors were faced with overwhelming wound infection and a high incidence of wound dehiscence; similar to the study by Adesunkanmi and Talwar S [10]. Overall, of 4 patients (11 .42 %) who suffered mortality; all 4 were died after 10 days (range 11 days-52 days) mean of 24.25 days whereas study by Adesunkanmi [10] 53% died within 5 days of post-operative period and 71 % were died within 10 days. Survivors had hospital stays ranging from 7 days to 59 days with a mean of 24 days; compared to study by Adesunkanmi [10] survivors had hospital stays ranging from 15 to 35 days.

CONCLUSIONS

- Perforation to operation time interval is the single most important prognostic factor, as similar to other studies.
- Patients who presented late to the hospital had developed more morbidity and mortality rates, patients presented early had low morbidity rates, and no mortality was seen in the present study.
- Perforations closer to the ileocaecal junction and perforations of size more than 0.5cm had more morbidity mortality rates.
- Multiple perforations and gross contamination had an adverse effect.
- Early surgical intervention (primary closure) reduced the morbidity and mortality.
- Faecal fistulas have adversely affected the mortality rate.
- Survivors were faced with overwhelming wound infection and wound dehiscence with a longer hospital stay
- Triple antibiotic regime in the postoperative period with ceftriaxone, metronidazole and aminoglycoside (gentamicin or amikacin) had contributory effect on decreased rates of morbidity and mortality.

REFERENCES

1. Kayabali L; A Contemporary evaluation of enteric perforations in typhoid fever: I n t.Surg. 1990; 75: 96- 100.
2. Gibney EJ; Typhoid perforation: BJS 1985; 76: 887-889.
3. Chouhan MK; Typhoid enteric perforation BJS, 1982; 69: 173-175.
4. Archampong EQ; Operative typhoid perforation of the bowel B M J 1969; 3: 273-276.
5. Van Bastun JP; typhoid perforation - A Review of the literature since 1960: Trop. Geogr.Med.1994:46(6): 336-339.
6. Jin Pok Kim; Management of ileal perforation due to typhoid fever. Ann Surg. 1973; 181(1): 88-9.
7. Akgun Y; Typhoid enteric perforation B J S 1995; 82:1512-1515.
8. Charles N.Mock; Improvement in survival from typhoid ileal perforation Ann.Surg. March 1992; 244-248.
9. Ananth Narayan R, C.K.Jayaram Paniker; Textbook of Microbiology, 5th edition, 267-280.
10. Adesunkanmi ARK; The prognostic factors in typhoid ileal perforation: J.R.Co1.Surg. Edinb. 42, 1997:395-399.
11. Taiwar S; Typhoid enteric perforation. AUST. N Z J Surg.1997; 67(6): 351353.