Perforated typhoid enteritis in children

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Summary: A prospective study of 65 patients with perforated typhoid enteritis managed operatively over a 3 year period at a university hospital is presented. There were 45 males and 20 females with ages ranging from 5 to 15 years. Presenting symptoms were fever, abdominal pain, vomiting and either diarrhoea or constipation. All the patients were subjected to surgery and 56 (86%) underwent two-layer bowel closure after freshening of ulcer margins. The overall mortality rate in this study was 20% and was adversely influenced by the increasing duration of perforation, presence of shock and faecal peritonitis.

Early surgery after prompt and adequate resuscitation is life saving. However, prevention of typhoid fever by providing safe drinking water and better sanitary conditions appears to offer the best chance of decreasing the high rates of mortality and morbidity of this deadly disease.

Introduction

Typhoid fever is a major problem in the developing countries most commonly affecting children and young adults who are on the verge of a period of economic productivity; it thus has a devastating socioeconomic impact.^{1,2} The high mortality and morbidity of typhoid fever is not only because it occurs most commonly in areas with contaminated water supplies and inadequate waste disposal, but also because these are the areas where optimal medical care is lacking.³ Perforation of the bowel is the most dreaded complication of typhoid fever which is associated with mortality rates ranging from 19 to 59%.⁴ Though surgery is now widely accepted as the definitive treatment, there is no general agreement about the choice of procedure.^{5,6} However, there is no controversy regarding other therapeutic measures such as fluid and electrolyte therapy, blood transfusions and antibiotics which have an unequivocal role in reducing the mortality.^{1,3,4}

Patients and methods

Sixty-five patients with typhoid perforation treated at the University Hospital, Varanasi, India between April 1987 to March 1990 were studied prospectively. The diagnosis was based on clinical and radiological examination, Widal test and blood culture. All perforations were confirmed at laparotomy and wherever possible tissue was obtained for histopathological examination.

Results

Presenting clinical, laboratory and radiological features

In the present study the mean age of the patients was 9.6 (range 5–15) years. The male:female ratio was 2.2:1 with 57% of the patients presenting during the period July–October. During the study period 1,300 cases of uncomplicated typhoid fever were admitted in the paediatric medical wards suggesting a perforation rate of 5% in our area. A total of 69% of the patients had perforation in the second week of fever. Of these, 81% came to the hospital 48–96 hours after the perforation. The presenting symptoms, percentage of patients with the symptoms and the average duration of symptoms were as follows: (1) fever, 94%, 11 days; (2) abdominal pain, 92%, 6 days; (3) vomiting, 51%, 3 days; (4) diarrhoea, 75%, 3 days; (5) constipation, 15%, 3 days. Abdominal distension was seen in 85% of patients while 71% of patients had features of peritonitis in the form of guarding and rigidity. A total of 90% of the patients had abdominal tenderness which was generalized (58 patients) or localized (five patients). Masking of liver dullness could be elicited in only 63% of patients. 78% of the patients were dehydrated at the time of admission and signs of hypovolaemia, present in 63% of patients, required correction by administration of crystalloid solutions and blood transfusions (57%). The rectal examination was abnormal in 13 patients (20%) demonstrating rectal tenderness in four patients and fullness in nine patients (Table I).

The haemoglobin concentration showed a range of 6.6 g/dl–12 g/dl, 63% of patients having a

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Table I Symptoms and signs of typhoid perforation 65 patients

<i>Symptoms</i>	<i>Number</i>	<i>Percentage</i>	<i>Signs</i>	<i>Number</i>	<i>Percentage</i>
Fever	61	94	Distension	55	85
Abdominal pain	60	92	Peritonitis	46	71
Vomiting	33	51	Dehydration	51	78
Diarrhoea	49	75	Abdominal tenderness	63	97
Constipation	10	15			

concentration of less than 10 g/dl. White cell counts showed great variation with a range of $5.2\text{--}25.8 \times 10^9$ cells/ml. In 57% of patients the white cell counts were more than 10^{10} /ml. X-ray examination revealed free subdiaphragmatic gas in only 43 (66%) patients on plain X-ray of the abdomen in the erect posture. In 15 patients (23%) there were features of free fluid and ileus. However, in six patients (9%) no abnormality was detected. The Widal agglutination test was performed in 29 patients and significant titres were seen in only 10. Blood cultures were performed in 14 patients but were positive in only four patients. The results of blood culture and Widal tests were not available preoperatively and did not contribute to the diagnosis.

Resuscitation

Aggressive fluid and electrolyte replacement was done in all cases and blood transfusion was given in 37 patients (57%) who had severe anaemia and/or hypovolaemia. Fifteen patients (23%) presented to the hospital in shock and were vigorously managed. The average time required for preoperative resuscitation was 10 (range 4–28) hours. All the patients received nasogastric decompression, urinary catheterization for monitoring fluid status and intravenous antibiotics. A combination of chloramphenicol, ampicillin and metronidazole was used in 58 patients (89%) while seven patients (11%) who had been previously treated received intravenous ciprofloxacin and metronidazole. The average duration of time from presentation of the patient to the hospital and the start of the operation was 18 hours with a range of 8 hours to 5 days. A total of 49 patients (75%) underwent surgery within 24 hours of admission. Patients with prolonged admission to operation interval were those not correctly diagnosed or who perforated while undergoing medical treatment for typhoid enteritis.

Surgical procedure

All patients were subjected to a laparotomy through a midline incision under general anaes-

thesia. There was moderate to severe peritoneal contamination in 54 (83%) cases and minimal peritoneal contamination in 11 cases (17%). Fifty-nine patients (91%) had ileal perforation within 30 cm of the ileocaecal junction while in two patients (3%) caecal perforation was present. Ten patients (15%) had multiple perforations. Thirteen patients (20%) had at least one preperforation additionally which was oversewn with single layer 2-0 silk suture to prevent subsequent perforation. Fifty-six patients (86%) were managed by simple debridement of the ulcer margin and two-layer bowel closure using catgut for the inner layer and silk for the outer layer. Four patients underwent segmental ileal resection and primary two-layer bowel anastomoses while two patients had ileocaecal resection with ileocolic anastomoses. Three patients with multiple ileal perforations were treated with ileotransverse colostomy and closure of the perforations in view of the poor general condition of the patients intra-operatively. The peritoneum was cleaned by saline lavage and single layer closure using non-absorbable polypropylene sutures was carried out. The skin and subcutaneous tissues were usually left open to heal by secondary intention.

Postoperative progress

The commonest postoperative complication was wound infection which was seen in 53 cases (81%) followed by wound dehiscence in 31 (48%) and burst abdomen in six (9%) cases. Fifteen patients (23%) developed faecal fistula. Other complications included intra-abdominal abscesses in eight (12%) patients, pulmonary complications in 12 (18%) and intestinal obstruction in four (6%) cases (Table II). Twenty-five patients (38%) underwent subsequent minor operating room procedures for wound debridement in 15, closure of wound dehiscence in four and peritoneal reclosure in six patients. Four patients (6%) had transrectal drainage of pelvic abscesses. Five major relaparotomies were performed of which three were for faecal fistula and two for drainage of intra-abdominal abscesses.

There were 13 deaths (20%) in this series of

Table II Postoperative complications in patients with typhoid perforation

Complication	Number of cases	Percentage
Wound infection	53	81
Wound dehiscence	31	48
Burst abdomen	6	9
Faecal fistula	15	23
Intraabdominal abscesses	8	12
Pulmonary complications	12	18
Septicaemia	15	23
Intestinal obstruction	4	6

which nine (69%) were attributed to progressive overwhelming sepsis. Two patients died from aspiration and one from anaesthetic complications. In one patient the cause of death could not be determined. The average time from operation to death was 4 days (range 1 hour to 14 days). Five patients (38%) died within 24 hours of surgery. Factors that correlated with mortality were prolonged perforation to admission interval, presence of shock at the time of admission, severe peritoneal contamination and multiple perforations.

Discussion

The mortality rate for untreated typhoid fever is 15%.⁴ Gastrointestinal haemorrhage and intestinal perforation are the most serious complications of this disease and account for most of the fatalities. In one study haemorrhage occurred in 0.8% and perforation in 5.3% of hospitalized patients.^{6,7} Typhoid ileal perforation occurs in both sexes and in all age groups. As in other studies,⁸⁻¹³ we found a male preponderance with a male:female ratio of 2.2:1. A seasonal variation in the incidence of perforation has been reported previously.^{14,15} In the present study 57% of the patients presented during the period July–October. Perforation usually occurs in the second week of clinical illness, the average length of the history being 8–11 days.¹⁵⁻¹⁷ Two-thirds of our patients perforated in the second week of illness. The complication of perforation and peritonitis is accompanied by severe fluid deficits and biochemical derangements which need to be corrected before surgery.²⁻⁴ Absence of pneumoperitoneum on radiological examination or leucocytosis are not sufficient criteria to exclude the diagnosis of typhoid perforation which is based upon clinical examination and typical operative findings. Perforation occurs classically on the

antimesenteric border of the terminal ileum.⁸ Presence of Mallory cells at the site of perforation or in adjacent lymph nodes is confirmatory.⁴

Conservative management which was advocated earlier¹⁸ in patients with typhoid ileal perforation has been accompanied by unacceptable mortality rates of over 60% in some series.^{1,5} It is therefore now widely accepted that the general condition of the patient permitting, surgery is mandatory in these patients.^{1-5,9,13,14,19,20} The optimal surgical procedure, however, has been a matter of debate.^{5,9,20} Excision of the ulcer margins and primary suture of the ileum is in our experience a simple and effective procedure which has been successfully used in other series also.^{1-4,13,14,20,21} Complete exclusion of the repair by ileotransverse colostomy⁶ or partial exclusion using a lateral tube ileostomy have been advocated to reduce the incidence of postoperative fistulae.^{22,23} Neither procedure has been entirely successful in doing so and is moreover associated with a high mortality rate.^{2,13} Bowel resection has also been previously recommended.^{24,25} In our opinion resection is advisable if three or more perforations are present. Right hemicolectomy is justified only in patients with caecal perforation. Peritoneal lavage with warm saline appeared to minimize late intraperitoneal sepsis though it is difficult to offer any guidelines in the absence of randomized controlled trials. We used drains only in patients with established abscesses. It is our practice to leave the superficial layers of the abdominal wound open to reduce the risk of infection.

In typhoid perforation early surgery after prompt and adequate resuscitation is life saving. In our study patients who underwent operation soon after they perforated had a better prognosis. The prognostic improvement achieved by reducing the perforation–operation interval has also been recognized by other workers.^{1-3,13-17,19} Thus there is at present no justification for continued conservative treatment once the diagnosis of perforation is made and adequate resuscitation has been carried out.

There has been a dramatic improvement in the mortality from typhoid ileal perforation over the last decade and a half^{2,3,13} which has been influenced not only by factors such as improvements in fluid management and availability of newer antibiotics (especially against anaerobic infections), but also by the recognition that prompt surgery with careful closure of the perforation is essential. Ultimately, however, the problem is one that can only be solved by public measures such as provision of clean water supply, safe disposal of sewage and instruction in personal hygiene.

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