

TYPHOID ILEAL PERFORATION: ANALYSIS OF MORBIDITY AND MORTALITY IN 89 CHILDREN

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ABSTRACT

Background: Typhoid ileal perforation is still prevalent in many developing countries. Despite the advances in the management, the outcome in children is still very poor.

Objective: To determine the morbidity and mortality of childhood typhoid ileal perforation in a tertiary referral centre in southeast Nigeria

Methods: Retrospective evaluation of 89 children operated for typhoid ileal perforation over a 10-year period (January 1, 1995 through December 31, 2004) at the University of Nigeria Teaching Hospital, Enugu.

Results: There were 54 (60.7%) boys and 35 (39.3%) girls aged 1–15 years (mean 9.1 years). Thirty-nine (43.8%) were >10 years. Fever and generalized abdominal pain were the predominant symptoms for 5–21 days (mean 13.4 days) and 2–13 days (mean 8.8 days) respectively before presentation. Seventeen (89.5%) of those < 5 years had vomiting. Pneumoperitoneum was demonstrated radiologically in 59 (66.3%) children. Surgical treatment involved simple closure in 46 (51.7%) children and segmental intestinal resection in 43 (48.3%). Surgical site infection 41 (46.1%), chest infection 21 (23.6%) and re-perforation 19 (21.3%) were the commonest postoperative complications. The overall mortality was 17 (19.1%) from overwhelming infection. Age < 5 years and prolongation of perforation-operation interval worsened morbidity and mortality.

Conclusion: Typhoid ileal perforation in childhood is associated with high morbidity and mortality. Outcome can be improved by early presentation and intervention.

Key Words: Typhoid fever, ileal perforation, morbidity, mortality, childhood. (Accepted 14 March 2007)

INTRODUCTION

Typhoid fever is endemic in many developing countries¹⁻³. As reported in adults, perforation of the ileum is also the most important surgical complication in children⁴. This presents a challenge to the paediatric surgeon working in endemic areas. Despite the advances in the medical treatment of typhoid fever, the perforation rate has remained at about 3-11%^{3, 5}. The morbidity and mortality of typhoid perforation is reported to be high^{3, 5-7}. Late presentation, poverty and probably, infection by a virulent strain of the causative organism may be the main factors contributing to the poor outcome⁵⁻⁸. This has led many authors to advocate for control of the disease through improvement in sanitation and mass immunization in endemic areas^{1, 3, 8-11}. Nonetheless, early presentation, prompt resuscitation and sound surgical judgment remain the cornerstone for survival^{1-6, 12-16}.

The purpose of this study is to evaluate morbidity and mortality of typhoid ileal perforation in children over a 10-year period in southeastern Nigeria. Between January 1995 and December 2004, 96 children aged 1-15 years had operation for suspected typhoid perforation at the University of Nigeria Teaching Hospital, Enugu Nigeria. Their hospital records were retrospectively studied. All were resuscitated using crystalloid infusion, intravenous chloramphenicol, Gentamycin and metronidazole before operative intervention. Diagnosis of typhoid was suspected clinically or with positive Widal test and confirmed by stool, blood, urine, and peritoneal fluid culture. Widal test was taken to be positive if the 'O' or H titre is >1/80. Of the 96 children, 4 were excluded from the study on the basis of insufficient information from their case records, while an additional 3 were excluded because of uncertainty concerning the aetiology of the illness or perforation.

Data of the remaining 89 cases were studied. The data collected included age, sex, clinical features, duration of symptoms before presentation, and interval

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between presentation and operative intervention. The investigations, findings at operation, operative procedure, postoperative course and complications were also obtained from the case-notes, discharge summaries and operation notes.

Chi-square was used to test the significance of association between age and mortality. The significance of association between mortality and interval from onset of abdominal pain to operation was equally tested. Duration of abdominal pain was used here because of the difficulty with determining the exact time of perforation and hence the perforation-operation interval.

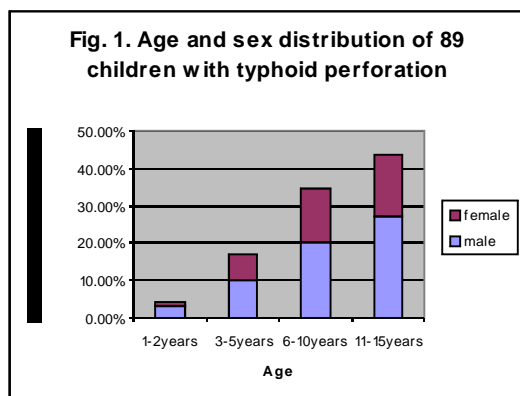
Morbidity and mortality were also compared among the various operative procedures.

RESULTS

The ages of the children with typhoid perforation ranged from 1 to 15 years (mean 9.1years). There were 54 boys (60.7%) and 35 girls (39.3%).

Of these, 17 children had perforation while on treatment for typhoid fever in our institution while 72 children perforated before presentation.

Figure 1 shows the age and sex distribution



Clinical Presentation

The main presentations were fever and generalized abdominal pain and tenderness (Table 1) except

Table 1. Clinical features in 89 children with typhoid perforation

Clinical feature	No	%
Abdominal tenderness	89	100
Fever	81	91.0
Abdominal pain	73	82.0
Constipation	43	48.3
Vomiting	38	42.7
Diarrhea	31	34.8
Abdominal distension	24	26.9

In the Under 5-years where fever and vomiting were the prominent symptoms. Fever was present for 5-21 days (mean 13.4 days), and abdominal pain 2-13 days (mean 8.8 days). There was vomiting in 38 (42.7%) children. Of the 19 children less than 5 years, 17 (89.5%) presented with vomiting. Forty-three (48.3%) had constipation while 31 (34.8%) had diarrhea. All the 89 children had abdominal tenderness, but abdominal distension was present in only 24 (26.9%). Anaemia defined as haematocrit of <30% was present in 62 (69.7%) children.

Investigations

All the 89 children had laboratory confirmation of typhoid infection. Widal test was positive in 56 of the children while 21 children had positive blood culture for Salmonella typhi. Those who had negative cultures had antibiotics before samples were taken. Forty-four and 42 children respectively had positive stool and peritoneal fluid cultures for Salmonella typhi.

There was leucocytosis (WBC > 10,000 per cu mm) in 48 (53.9%) children.

Plain abdominal and chest radiograph were done on all the children and 59 (66.3%) children had radiological evidence of pneumoperitoneum.

Operative treatment

The average time from presentation to operation was 12 hours (range 4-96 hours). Anaesthesia was by general endotracheal intubation with ketamine used for induction and maintenance of anaesthesia.

At laparotomy, all the children had faecal contamination of the peritoneum. The distribution of the perforations is as follows: single perforation in 46 (51.7%), 2 perforations in 18 (20.2%), 3 perforations in 14 (15.7%), and 4 perforations in 11 (12.4%) children each respectively

Table 2. The distribution of number of perforations among the 89 children

No of perforations per patients	No of children %
Single perforation	46(51.7%)
2 perforations	18(20.2%)
3 perforations	14(15.7%)
4 perforations	11(12.4%)

Fourteen (73.7%) of children < 5 years old had > 1 perforation. The average number of perforations was 1.9. The perforations were sited in the ileum and the distance from the ileocaecal junction was 1-70 cm (mean 30 cm). Forty-six children (51.7%) had simple closure, 27 (30.3%) segmental ileal resection, and 16 (18.0%) right hemicolectomy. All the wounds were closed primarily.

Complications

Surgical site infection was the commonest postoperative complication and was found in 41 (46.1%) of the children. Chest infection occurred in 21 (23.6%) and reoperation in 19 (21.3%). The frequency of reoperation was greater in children who had simple closure compared with the other procedures. Fourteen of 46 children treated with simple closure reoperated while 2 of 17 children treated with ileal resection reoperated. Reoperation occurred at different sites after 3-9 days (mean 5 days). Wound dehiscence, anastomotic leak, and intra-abdominal abscess occurred in 7 (7.9%), 6 (6.7%) and 2 (2.2%) of the children respectively

Table 3: Postoperative complications in 89 children with typhoid ileal perforation

Complication	No	%
Surgical site infection	41	46.1
Chest infection	21	23.6
Reoperation	16	21.3
Wound dehiscence	7	7.9
Anastomotic leak	6	6.7
Intra-abdominal abscess	2	2.2

Mortality

The overall mortality was 17 (19.1%). Death occurred 36 hours to 11 days after operation (mean 5.2 days) from overwhelming infection. Mortality rates varied from 10 (21.7%) in those who had simple closure, 3 (18.8%) in cases managed by right hemicolectomy, to 4 (14.8%) in those treated with ileal resection.

Out of the 19 children 5 years of age and younger, 8 (42.1%) died, while death occurred in 6 (19.4%) and 4 (10.3%) children 6-10 years and 11-15 years of age respectively. The difference was not statistically significant ($P > 0.05$)

The interval between onset of abdominal pain and operative intervention affected the mortality. The mortality rate for the children who had operation after < 3 days, 3-5 days, 6-10 days and > 10 days of abdominal pain were 7.7% (1/13), 15.4% (2/13), 20.6% (7/34) and 30.4% (7/23) respectively. The difference was not statistically significant ($P > 0.05$) For those that survived, the average duration of hospital stay was 22 days (range 18-42 days).

DISCUSSION

In the present report, the peak incidence was between 11 and 15 years (mean 9.1 years) with the youngest child being 1 year old. This compares with other reports where the youngest child was 2 years

old⁶ and the mean age was 10 years³. In a report from northern Nigeria, the youngest child was 2 months of age¹. Young infants less than 1 year of age are not commonly affected by typhoid. This may be related to the eating habits as in this age the feeding is often guided by the parents. Other studies believe that the protection is cytokine-mediated⁷.

Diagnosis of typhoid perforation can be made on the basis of clinical features of acute abdomen preceded by 1-3 week history of febrile illness⁵. The most prominent symptoms in this study were fever and abdominal pain. The average duration of abdominal pain of 8.8 days suggests that most of the children presented late. In children less than 5 years old, the presentation was atypical with fever and vomiting being the main symptoms. Similar observation has been reported³. The emphasis here is to have a high index of suspicion in this age group in order to achieve early diagnosis.

Common laboratory and radiological investigations available in many developing countries such as Widal test, blood culture and plain abdominal and chest radiographs may not give conclusive preoperative diagnosis^{5, 6, 11}. It is therefore imperative to proceed with resuscitation¹³ and operative intervention when the characteristic clinical features are present. In this study as in some earlier reports^{6, 12} all the perforations were located in the ileum. Though there have been some reports of colonic perforations^{15, 16}, involvement of the large bowel is rare. Despite the rarity of large bowel involvement in typhoid perforation, it is important that the entire intestine should be diligently inspected at operation to avoid missed perforations in the large bowel.

Earlier studies have reported various operative techniques^{4, 5, 6, 9, 17}. The advantages of each of these procedures have equally been documented. In the present report, most of the children had simple closure of the perforation. Segmental resection and anastomosis has been found in some studies to be superior to the other procedures irrespective of the number of perforations^{18, 19}. Despite this, some authors have advised that treatment should be individualized, as no operative procedure is likely to be applicable in all cases⁸.

Closure of surgical site has equally generated some controversy. It is argued frequently that primary closure of surgical site will invariably lead to surgical site infection as a result of contamination of the wound by purulent peritoneal exudates. However, studies have suggested that delayed primary closure offers no advantage over primary closure in preventing surgical site infection or wound dehiscence²⁰.

Morbidity following operation for typhoid perforation is high. The reported incidence ranges from 37.5%¹⁹ to 88.1%²¹. In the present report the incidence was 56.9% with surgical site infection, chest infection and reoperation being the most common complications. The high incidence of reoperation associated with simple closure (30.4% in this study) may be related to the inadequacy of the procedure in removing the surrounding diseased parts of the bowel. Some authors^{1,6,15,22} have reported mortalities of 3-39%. Mortality in this study was 20.2%. As in this study, overwhelming infection is the commonest reported cause of death^{3, 6, 8}. Overwhelming infection may be a consequence of uncontrolled progression of the primary disease or it may follow anastomotic leak or reoperation with postoperative peritonitis⁹. Among the patient factors that affect morbidity and mortality, the most significant has been the perforation-operation interval^{8, 12} which is related to the duration of abdominal pain. The finding in our study of increasing mortality with increase in duration of abdominal pain before operation agrees with these reports. It has equally been noted that mortality was higher in children < 5 years³. In the present report, the mortality rate in this age group was higher than that in older children. Though the difference was not statistically significant, it may be a reflection of the severity of the disease in the younger children. The global burden of the typhoid is considerable²³. Therefore, efforts at disease control and prevention are important. Long-term prevention of typhoid and its complication will in effect involve improvement in sanitation, public health education and provision of portable and safe drinking water. Recently²⁴ mass immunization of children with Typhim vi and Ty21a vaccine have been shown to be an important and effective strategy for prevention of typhoid fever in high risk populations. A cluster-randomized trial in China²⁴ has shown that mass immunization is feasible, safe and in children, up to 90% coverage can be achieved. Similar benefits have been reported in other countries^{25, 26}. It will be beneficial to incorporate typhoid immunization into the existing immunization programmes especially in endemic areas.

CONCLUSION

Morbidity and mortality following childhood typhoid ileal perforation is high in our environment. Such factors as age less than 5 years and late presentation are associated with poorer outcome. Improvement in survival may be accomplished by ensuring early presentation and early operative intervention. Long term solution may lie in

improvement of sanitation, provision of safe drinking water, health education and mass Immunization.

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