

ORIGINAL ARTICLE

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Typhoid ileal perforation in Nigerian children: an analysis of 106 operative cases

Accepted: 20 November 2000

Abstract Typhoid ileal perforation (TP) is a major problem in developing countries and carries a high mortality. The purpose of this retrospective study from Nigeria was to review the outcome in children less than 15 years of age who underwent surgery for TP from 1984 to 1999. Demographic data, clinical features, results of investigations, findings at surgery, postoperative course, and complications were recorded. There were 55 boys and 51 girls. The median age at presentation was 10 years (range 3–14). The surgically confirmed perforation rate was 11.0%. The clinical features in children older than 5 years were similar to already documented patterns in the literature. In children less than 5 years old the predominant symptoms were fever and vomiting only. Therefore, in the very young a high index of suspicion is required to avoid delay in diagnosis. Ninety eight patients (92.5%) had simple double-layer closure of the perforation. The mean hospital stay among survivors was 23.6 ± 18.8 days. The commonest postoperative complications were wound infection and enterocutaneous fistula. The overall mortality was 23.8%, increasing to 50% in children aged less than 5 years, although the difference was not statistically significant ($P > 0.05$). To improve survival in TP, attention should be focused on perioperative resuscitation and early intervention. The provision of potable water, adequate sanitation, and active immunisation are means to eradicate the disease.

Keywords Typhoid · Perforation · Children

Introduction

In developing countries, typhoid fever still remains a major health problem because of poor sanitary

conditions [1, 2]. Typhoid perforation (TP) is a well-known complication of typhoid enteritis that carries a high mortality [3]. In Nigeria, the current mortality reported for TP ranges from 12.8% to 57% [4–8]. The present study from a tertiary health facility in the middle belt of Nigeria highlights the peculiarities of this surgical problem and attempts to compare the outcome of surgery in the paediatric age group with that of adults.

Patients and methods

All children less than 15 years of age who underwent surgery for TP at the University of Ilorin Teaching Hospital between 1984 and 1999 were retrospectively studied. The diagnosis was based on history, physical findings, and radiological evidence of a pneumoperitoneum. The management when perforation was suspected consisted of nasogastric tube decompression, aggressive fluid resuscitation, usually with isotonic saline, and correction of electrolyte derangement. Intravenous antimicrobials (chloramphenicol or amoxicillin, gentamicin, and metronidazole) were administered. Preoperative blood transfusion was given where indicated. The adequacy of resuscitation was assessed by monitoring the urine output and serum urea and electrolytes.

Patients underwent exploratory laparotomy under general endotracheal anaesthesia with halothane. Access to the abdominal cavity was by a lower midline or right lower paramedian incision. Single or multiple perforations that were widely spaced were debrided and closed simply in two layers. In multiple close-lying perforations, segmental resection and end-to-end anastomosis was performed. After thorough peritoneal lavage with warm isotonic saline, a corrugated rubber drain was placed and the abdomen was closed with an 0 nylon suture of the rectus sheath. The skin was primarily closed with 3-0 nylon. Surgical confirmation of the perforation was ascertained in all patients.

The data extracted from the case notes included patient age, sex, clinical features, and results of laboratory and radiological investigations in addition to the findings and outcome of surgery. The incidence of complications and duration of hospital stay among survivors were also documented. The data collected were analysed using Epiinfo 6.02 version statistical software developed by the Center for Disease Control, Atlanta. The results were presented as frequency tables. The means and standard deviations were calculated for some of the variables. Some variables were compared and significance was taken at 5% probability level ($P < 0.05$).

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Results

Over the 16-year period, 954 children less than 15 years of age were diagnosed with typhoid fever based on clinical features, stool and urine microscopy and cultures, and blood cultures for *Salmonella typhi*; 108 (11%) had an ileal perforation confirmed at surgery. This represents 51.7% of all cases of TP in children and adults. There were 106 case notes available for review. The patients ages ranged from 3 to 14 years, with a median age at presentation of 10 years. There were 55 boys and 51 girls.

Fever (100%) and abdominal pain (90.6%) were the two most frequent symptoms. Vomiting was present in 60% and diarrhoea in 34% of cases. All patients presented with some degree of abdominal tenderness. Bowel sounds were absent or hypoactive in 95 (89.6%) patients. The time interval between presentation and surgery ranged from 6 to 48 h (median 20 h). There was radiological evidence of a pneumoperitoneum in 27 (64.3%) of the 42 patients whose radiographs were available for analysis. Leucocytosis was found in 22% of 55 children with white blood cell count (WBC) recordings, with leucopenia of less than $4 \times 10^9/l$ in 23.6%. Serum electrolytes were measured in 60 patients and plasma sodium was less than 135 mmol/l in 36 (60%), hypokalaemia was present in 13% and elevated urea in 57% of cases.

The distance from the ileocaecal junction to the perforation was recorded in 88 patients and was within 30 cm in 82.1%; 34 (38.6%) patients had multiple perforations [range 2–12]. The number of perforations did not significantly affect the outcome ($p > 0.05$). In 94.3% of patients excision of the ulcer edge and simple two-layer closure of the perforation was performed. In 4 patients with multiple perforations in close proximity, segmental resection and anastomosis was carried out. In the remaining 2 the perforations had sealed and only peritoneal lavage was done.

The mean duration of hospital stay was 23.6 ± 18.8 days. The commonest postoperative complication was wound infection (54%). Enterocutaneous fistulae (ECF) occurred in 5 patients (6.3%) and increased the mean hospital stay to 89 days (maximum 134 days). The overall mortality in this series was 23.8%, however, the mortality among children aged less than 5 years was 50%. In 24 of the 25 patients who died, death occurred within 24 h postoperatively. One died at 74 days due to malnutrition from an ECF. In 21 cases, overwhelming sepsis was the cause of death. Three patients died from complications of anaesthesia.

Discussion

The incidence of TP in typhoid-endemic areas varies widely. The highest incidence occurs in Western Africa, with perforation rates of 10.1% to 33% [5, 7, 9, 10]

compared with the rest of Africa where rates are lower (0.58%–5%) [11–14]. In a review of TP, Atimomo [15] attributed this wide variation to the virulence of salmonella strains found in each location, host resistance, and probably delays in presentation, diagnosis, and treatment. Typhoid fever is rare in children less than 2 years of age [16]. This is consistent with the findings in the current series, in which no patient was less than 3 years old. In most series involving only children, the sex distribution shows a slight male preponderance (1.1–1.7:1) [5, 6, 17], whereas in series involving adults the sex distribution has a more pronounced male preponderance [4, 18].

The clinical features in our patients with TP were no different from patterns already documented in the literature [4, 5, 11]. In children less than 5 years of age, fever, vomiting, and diarrhoea were the predominant symptoms, with no history of abdominal pain in 10 of the 11 patients. Therefore, a high index of suspicion with thorough and repeated clinical examinations is required to avoid a delay in diagnosis. The presence of a pneumoperitoneum in 63% of the children compares with previous reports showing 54.1% to 70% [4, 7, 10, 19]. Where there is a clear indication for surgery, radiological investigations should not unnecessarily interfere with resuscitation or delay surgery, since negative evidence of a pneumoperitoneum on a chest radiograph may not exclude TP. Unlike other series [19, 20], leucocytosis was not a prominent feature of TP in our study. There was no significant relationship between survival and WBC ($p > 0.05$), although Mock et al. [21] showed that a low wbc influenced outcome in TP.

There is no place for conservative management of TP, and surgery is the only option [22–24]. The aims are to eliminate the source of continuing contamination of the peritoneal cavity, early control of sepsis, and prevention of progression. We favour debridement and simple two-layer closure [4, 6, 11]; segmental resection and anastomosis are employed where there are multiple perforations in close proximity. Simple closure of the perforation is an easy procedure in a very ill patient. The surgical procedure does not appear to reduce the mortality of typhoid fever [25–27]; mortality is related mainly to overwhelming sepsis. The range of procedures employed include bypass procedures like lateral tube ileostomy [25] and end-to-side ileotransverse colostomy [25, 26], which is claimed to decrease morbidity, especially that of ECF. More extensive procedures have also been advocated such as segmental resection and anastomosis [27, 28].

The postoperative complication rate was very high (53%). The commonest complication was wound infection (54%), which was responsible for prolonged hospitalisation. The mean duration of hospital stay in patients with a complication of ECF was 89 days. The mortality of 24% in this series is similar to that in the recent literature [5, 6, 17], although lower rates of 2% to 9% have been reported [29, 30]. The mortality in children less than 5 years old in this study was 50%, how-

ever, there was no statistically significant influence of age at presentation on outcome. Mock *et al.* [21] did, however, find that extremes of age have an adverse effect on the mortality of TP.

Our findings underscore the need for a high index of suspicion of TP in school-aged children with symptoms resembling typhoid fever. Improved perioperative care, including active preoperative resuscitation and early surgical intervention, may improve survival, but the primary means of prevention remain the provision of clean drinking water and improved sanitation. The incidence of the disease is also expected to decline with the imminent introduction of a vaccine (Typhim V) into the current national programme of immunization.

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