Typhoid Intestinal Perforation In Children In Ilorin: Salmonella Versus The Surgeon: Who Is Winning The Race?

J.O.Adeniran, J.O Taiwo

Paediatric Surgery Unit, University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria

Abstract

Background/Objective

To analyze the outcome of the management of cases of salmonella enteric perforations since the Paediatric Surgical Unit was established at University of Ilorin (Nigeria) Teaching Hospital.

Patients & Methods

All paediatric patients managed with typhoid enteric perforations from 2000 to 2006 were retrospectively reviewed. Age, sex, time of operation, type of anesthesia, number and site of perforations, operative procedure, postoperative complications and causes of mortality were extracted from the patients' case notes. The results were compared to an earlier report from this hospital, and recent reports from other parts of the developing countries.

RESULTS: One hundred and fifty-seven children had operation for typhoid intestinal perforation over the 7-year period. Complete case notes were seen and analyzed for 110 patients. There were 64 boys and 46 girls (M:F=1.4:1). Age ranged from 3yrs to 15 yrs (mean 7.6yrs). ASA scores were IIIE in 71 (64.5%) children, and IVE in 35 (31.8%). Seventy-three patients (66.4%) had single perforations; 28 had multiple ileal perforations only, 9 had multiple ileal and colonic perforations. Ninety-eight patients (89.1%) had trimming of ulcer edges and simple closure, 3 had wedge resection and 9 (8.2%) right hemicolectomies. Seventy patients (63.6%) had superficial wound infection, 6.4% had intra-abdominal abscesses, 7.3% had complete wound dehiscence and 5.5% had enterocutaneous fistula. The mean duration of hospital stay was 21days, and the overall mortality was 7.3%.

CONCLUSION: Despite public health measures, cases of intestinal salmonellosis presenting in our hospital continue to rise, and the patients still present late. We now see more intestinal perforations per patient, and more colonic involvement. Wound infection continues to be a problem, but incidences of wound dehiscence and burst abdomen have reduced. High-output faecal fistula is best managed with temporary ileostomy. Mortality is 7.3%. This paper details our technique of managing these patients to bring the mortality below 10%.

Key Words: Salmonella, Perforations, Ileal, Colonic, Ilorin.

Introduction

Due to lack of access to good health care, decent water supply, safe disposal of waste, and poor personal hygiene and illiteracy, salmonella infection still causes high morbidity and mortality in children in developing countries [1, 2]. Intestinal perforation from salmonellosis, a common complication of enteric fever, is the commonest indication for emergency operation in children above 4 yrs in our unit, and poses a challenge to management by surgeons [3 4]. It accounts for 75% of all gastrointestinal perforations in North Western Nigeria [5]. Rahman et al [6] analysed the results of 106 cases operated on mostly by general surgeons at the University Teaching Hospital, Ilorin, from 1984 to 1999. Our Paediatric Surgical Unit was established in 1999. This paper reviewed cases operated from 2000 to 2006. Findings at operation, operative management and postoperative complications were compared to cases earlier managed in this center by general surgeons, and recent reports from other centers in developing countries.

Patients & Methods

All the patients below 15yrs of age who had an operation for typhoid intestinal perforation from January 2000 to December 2006 at the University Teaching Hospital, Ilorin, were retrospectively studied. From a clinical working diagnosis of generalized peritonitis, patients had blood taken for haemogram, urea and electrolytes, blood cultures and blood cross-match. Pre-operatively, intravenous fluids were given for hydration, naso-gastric tube inserted for stomach decompression,

Corresponding Author

Dr. J. O. Adeniran
P. O. Box 5708
Ilorin, Kwara State, Nigeria
E-mail: adeniranjodr@yahoo.com

urinary catheter inserted to monitor hourly urine output, and suitable parenteral antibiotics given. Poor patients had a combination of intravenous chloramphenicol and metronidazole pre-operatively, while patients who could afford it had either a 3rd generation cephalosporin or ciprofloxacin, and metronidazole parenterally. Intravenous gentamicin was added for all patients post-operatively for 72hrs. American Society of Anaesthesia (ASA) Score [7] was used to assess fitness for general anaesthesia. Patients who were not too ill (ASA I & II) had halothane, nitrous oxide and oxygen for anaesthesia. Others (ASA III & IV) had local infiltration of the operation site with xylocaine, combined with ketamine and oxygen. Muscle paralysis with pavlon was discouraged in this group. A system of deferment of payment was pursued whereby poor patients were allowed to defer some hospital bills so that operation was not unnecessarily delayed. Access to the abdomen was usually by right paramedian incisions. Single perforations were trimmed and closed in 2 layers. Multiple perforations far apart were closed individually. The bowel was resected if the perforations were close together. Perforations in the caecum or right side of colon were managed with right hemicolectomy. The peritoneum was generously lavaged with warm saline and corrugated drain inserted in the pelvis. The abdomen was closed with nylon as mass closure (continuous or interrupted) and interrupted nylon mattress suture applied to skin. Two tension sutures were usually inserted in patients with multiple perforations, patients who had hemicolectomies and patients who had re-operation for faecal fistula or intra-abdominal abscess. Patient's stool was cultured just before discharge. Antibiotics were given for positive cultures, usually for 2 weeks, to prevent the chronic carrier status. Patient's sex, age, findings at operation, postoperative complications and final outcome were extracted from patient's case folders and compared to the previous report in this hospital.

Results

One hundred and fifty-seven patients managed in the unit over the 7-yr period had surgical confirmation of intestinal perforation. Out of these, 110 complete case notes were found and analysed. There were 64 males and 46 females (M/F=1.4/1). Age ranged from 3 15 yrs (mean 7.8yrs). Patients were seen all the year round but peak incidences occurred in May & August. Twenty-eight patients (25.5%) presented within the 1st week of the illness, 60 (54.5%) within the 2nd week and 22 (20%) within the 3rd week. ASA scores were IIE in 4 patients, IIIE in 71 (64.5%) patients and IVE in 35 (31.8%). Operation was done within 24hrs of admission in 50 (45.5%) patients, but after 24 hrs in 60 (54.5%) patients. Eighty-one patients (73.6%) were operated on by senior registrars, 19 (17.3%) by consultants and 10 (9.1%) by registrars. All the re-do operations (burst abdomen, intra-abdominal abscesses and faecal fistula) were done by consultants. Seventy-three (66.4%) patients had single perforations, 37(33.6%) had multiple perforations (including 6 with colonic perforations). One patient had 14 perforations (13 ileal, 1 colonic), 1 had 27 perforations (19 ileal, 8 colonic) and 1 had 32 perforations (17 ileal, 15 colonic) (Table 1). Ninety-eight patients (89.1%) had trimming of ulcer edges and simple closure, 3 had wedge resection and 9 (8.2%) right hemicolectomies (Table 2). Seventy (63.6%) patients had superficial wound infection, 7 (6.4%) patients had intra-abdominal abscesses, and 8 (7.3%) complete wound dehiscence which required secondary wound closure. Six (5.5%) patients had enterocutaneous fistula, 4 were re-operated (3 had resection with ileostomy, 1 had right hemicolectomy) 2 were managed conservatively (Table 3). There were 8 deaths (7.3%): 2 from enterocutaneous fistula, 5 from multiple organ failure within 12 hrs of operation, 1 from acute renal failure. Mean hospital stay was 21days (range 15-52days).

Discussion

This report serves as an audit from the period the Paediatric Surgical Unit was established. It also helps other units in the third world to compare their methods of management and hopefully bring their mortality down to single figures. Disturbing from this study is that despite extensive public health measures the incidence of typhoid intestinal perforation presenting in the hospital (and mortality) continue to be unacceptably high. This report of 157 operated cases in 7 yrs averages 22.4 patients per year (up from 6.8/yr in Rahman's report from this hospital in 1999) and far more than reports from other centers (Fig. 1). From a peak of 44 patients in 2004, the figure is, now, hopefully, decreasing (Fig. 2). Although children as young as 2yrs have been reported with typhoid perforation [8] most children below 3yrs are not usually affected because the mothers supervice the feeding habits.

The mean age of 7.8yrs in this series agrees with other series of range 7-11yrs, so also the male

Table. 1: **TYPHOID INTESTINAL DISEASE PERFORATIONS REPORTED AT DIFFERENT CENTERS**

Author	Adeniran	Rahman	Irabor	Edino	Meir	Ameh	Uba
Single perforation	66.4%	61.4%	84.7	91.5%	71%		59.3%
Multiple perforations	25.5%	38.6%	15.3%	8.5%	29%		40.2%
Caecal/Colonic	8.2 %	nil	nil	nil	nil	nil	0.5%
Highest no of perforations in any patient	32	12	8		6	7	7

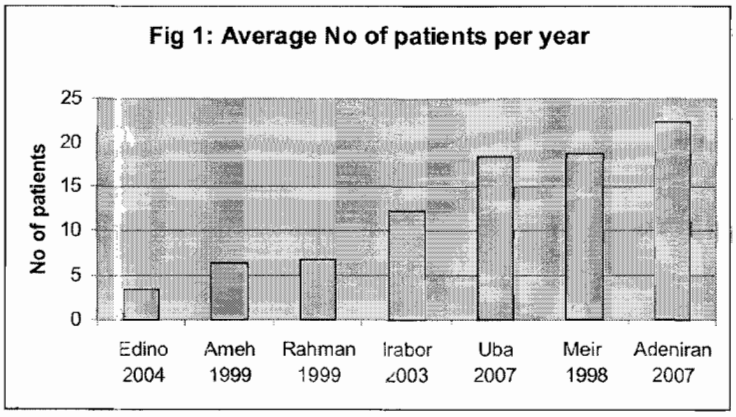
Table. 2: **OPERATIVE INTERVENTION IN TYPHOID PERFORATIONS**

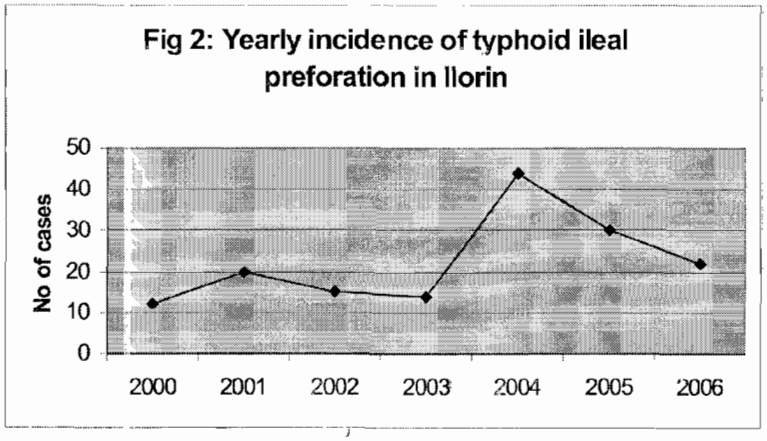
Author	Adeniran	Rahman	Irabor	Edino	Meir	Ameh	Uba
Simple Closure	89.1%	92.5%	95.1%	72.3%	95%	6%	74.5%
Wedge Resection	2.7%			8.3%		27%	14.5%
Segmental Resection		3.7%	2.2%	17.1%	5%	67%	3.6%
Hemi-colectomy	8.2% (9)		2.7%	2.1%			7.4%

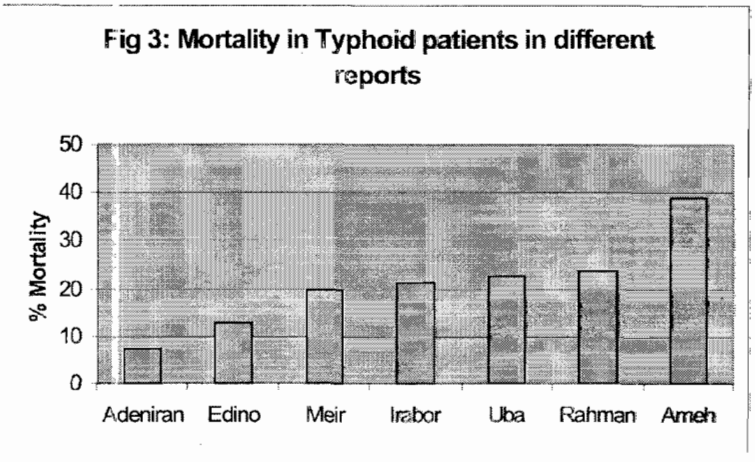
Table. 3: **COMPLICATIONS AFTER OPERATION ON TYPHOID PERFORATIONS**

Author	Adeniran	Rahman	Irabor	Edino	Meir	Ameh	Uba
Wound infection	63.6%	54%	87.5%	44.7%		53%	89.1%
Wound dehiscence			21.9%	31.9%	1.3%	13%	55.4%
Burst abdomen	7.3%						9.8%
Feacal fistula	5.5%	6.3%	8.7%	6.4%	1.3%	6.7%	25%
Residual Abscess	6.4%			8.5%	1.3%	6.7%	12.5%
Chest Infection						30%	53.3%
Reperforation					1.3%	6.7%	

preponderance [3, 6, 9, 10, 11]. Only about 30% of patients have pnuemo-peritoneum on plain abdominal X-ray [6, 11, 12] and since over 90% of patients come with established peritonitis [9] abdominal X-ray is no longer of critical diagnostic value, hence cost and unnecessary delay of operation are prevented [9, 13]. In early cases of peritonitis, the umbilical tenderness sign (Adeniran's sign) [14] is useful for diagnosis. The ASA score [7] is now being used to assess the fitness of our patients for general anaesthesia. Patients with scores of I & II could stand the regular halothane/nitrous oxide/oxygen combination. Patients with scores III & IV had local infiltration of their operative sites with lignocaine, and titrated doses of ketamine for intubation and maintainance of anaesthesia. Supplementary oxygen was also given as done by others [9,10]. Surgeons [3,6,11] who gave halothane/oxygen/pavlon combination to all patients had immediate postoperative respiratory depression, because typhoid, being a pan-systemic disease, also affects the myocardium.







Although single perforations are still the commonest [3, 6, 9, 11], multiple perforations are becoming increasingly common. In Rahman's earlier report from this hospital, 34 patients (38.6%) had more than 1 perforation compared to 41 (43.6 %) in this series. No colonic perforation was reported in the earlier series but 9 patients had colonic perforations in this series. Only Uba [11] in Jos reported 1 caecal perforation. There were no colonic perforations from other reports in Nigeria (Table1). While colonic perforations are thought to be due to direct bacterial invasion, ileal perforations result from enterotoxins produced from parasitized macrophages that cause hyperplasia, necrosis and ulceration [15, 16]. All patients with colonic perforations had right hemicolectomy.

This new report shows a higher incidence of wound infection (Table.3). Our new practice is to inspect the wound routinely on the 4th or 5th postoperative day, remove alternate sutures and start daily honey dressing. Because of the earlier high incidence of wound infection and wound dehiscence, we now prefer right paramedian, to midline, incisions in gaining access to the peritoneal cavity. The rectus abdominis muscle acts as a bed in future dehiscence to prevent burst abdomen. Trimming of the ulcer edge and double-layer closure is practiced by most surgeons (Table. 2) with satisfactory results [3, 6, 10, 11]. Ameh in Zaria [17] routinely did segmental ileal resection. Although they claim satisfactory results, the procedure added 30-45min of operating time [11, 12] and may have contributed to their higher mortality. Primary wound closure with continuous mattress nylon suture appears satisfactory although interrupted nylon could also be used. Only 6 patients (6.3%) had burst abdomen. Tension sutures are used after re-operation for burst abdomen, intra-abdominal collections and prophylactically after multiple perforations and after hemicolectomies. Others have found tension sutures useful in certain patients [11]. We use the combination of chloramphenicol /metronidazole /gentamycin for poor patients and a 3rd generation cephalosporin or ciprofloxacin/ metronidazole/ gentamycin for patients who could afford them. From our clinical observation there is not much difference in terms of morbidity or mortality. Most emergency operations were usually performed by junior doctors and anaesthetists after the day's routine list. This means that very sick patients were operated on by the least experienced hands, and at odd hours of the day. We have tried to prevent this by designating one theatre as 'emergency theatre' so that these patients can be operated on as soon as they are properly resuscitated. Most emergency operations can then be done during day-light hours, and consultants would be around to help junior doctors should the need arise. The chronic carrier state has not been appreciated by most clinicians. It is important to culture patient's stool

before discharge and treat with appropriate antibiotics.

Mortality figures from other reports range from 20-39% (Fig. 3). The mortality of 7.3% in this series not only gives a ray of hope for the future but shows a credible figure of less than 10% for the first time in recent reviews. Previous mortalities were mainly from severe sepsis (from late presentation) with a general anaesthetic of halothane/pavlon acting as additional cardio-toxic insult. Fourteen patients from Uba's series died on the operating table. Adequate preoperative preparation and choice of proper anaesthesia should prevent this. Our ASA scoring and local anaesthesia with ketamine has decreased mortality in this group. Most patients who survived the original operation died from faecal fistula. Our experience has shown that re-anastomosis when a patient has general septicaemia and uncontrolled peritoneal soilage leads to re-fistulation [13]. Because intravenous feeding may not be readily available in many developing countries, we have learnt to manage these cases with temporary ileostomy. The patient's nutrition can then be rapidly built up orally, and the ileostomy closed in 1-2 months. Many cases were operated late in the previous series due to financial handicap of the parents. Our method of deferment of payment helped this group. It is inevitable that junior doctors will operate on many of these patients as most of the cases were done as emergencies. If enough operations are done, complications are inevitable. It is, however, imperative that should a major complication occur, the most experienced hand (consultant) should do the re-operation.

In conclusion, cases of salmonella intestinal perforation continue to rise in our hospital despite extensive public health measures. We now see more perforations per patient and more colonic perforations. Vigorous resuscitation, early operative intervention when patient is clinically stable, deferment of payment for poor patients, minimal judicious anaesthesia, treatment in intensive therapy unit when necessary, and better-trained paediatric surgeons (in a paediatric surgery unit), have contributed to lower morbidity and mortality. Although salmonella may have increased its virulence and patients may still be presenting late in hospital, Ilorin surgeons may now be winning the race

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