Outcome of primary closure of abdominal wounds following typhoid perforation in children in Ile-Ife, Nigeria

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ABSTRACT

Background: Abdominal wounds following surgery for typhoid perforation are classified as dirty, with an infection rate of over 40%. To date, the optimal method for closure of these wounds remains controversial. Delayed primary closure which was conventionally recommended as standard practice, is now considered to be of no value in preventing surgical site infection (SSI). This study evaluates the outcome of primary closure of this class of wounds in children in Ile-Ife, Nigeria, and advocates a multidisciplinary wound management protocol. **Patients and Methods:** This is a retrospective study of children aged < 1–15 years who had had surgery for typhoid perforation in a teaching hospital in south western Nigeria, over a period of ten years. **Results:** Thirty-two patients, 18 males and 14 females, in the ratio of 1.3:1 were managed for typhoid perforation during the ten year period. All 32 patients had primary closure of their abdominal wounds. There was primary wound healing in six (18.8%) patients, while 19 (59.4%) patients had surgical site infections. Wound dehiscence, intraabdominal abscess, and faecal fistulas were the other complications documented in the study. **Conclusion:** Abdominal wounds of typhoid perforation, though classified as being dirty, can be closed primarily with good healing outcomes. A multidisciplinary approach to wound management will reduce the incidence of wound sepsis and its associated morbidity and costs.

Key words: Children, outcome of primary closure of abdominal wounds, typhoid perforation

INTRODUCTION

Following surgery for typhoid perforation, the resulting abdominal wounds are regarded as dirty,[1] because they are usually heavily contaminated by the commonly encountered faeculent, peritoneal exudates. Consequently, delayed primary closure was recommended as the standard method of handling such wounds.[2,3] It was thought that the delay in approximation of the wound margins encouraged drainage of the purulent wound discharge, thus preventing bacterial colonization while the wound gradually gained resistance to infection.[4] To date, the optimal method of closure of this class of wounds still remains controversial. The results of several recent studies[5,6] showed that delayed primary closure of wounds had no benefit over primary closure in terms of the incidence rate of surgical site infection (SSI). In addition, delayed primary closure is associated with anxiety of both the parents and children.[6] These aspects informed the practice of closing abdominal wounds following typhoid perforation in children in our centre.

The aim of this study was to evaluate the outcome of closing abdominal wounds following typhoid perforation in children in our environment, especially with regards to the incidence of wound sepsis and its associated morbidity and costs.

PATIENTS AND METHODS

The medical records from case notes of 38 patients aged 15 years and below with clinical and operative diagnoses of typhoid ileal perforation at the Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife, Nigeria, were retrospectively reviewed from May, 1994 to April, 2004. The ages, sex, clinical diagnoses, operative findings, method of wound closure, complications, duration of hospital stay, and overall outcome were retrieved from the case notes for analysis.

Six out of the 38 patients died within the first 48 hours of surgery before SSI could manifest and so were excluded from the study. The diagnosis of typhoid

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perforation was based mainly on clinical findings and intraoperative confirmation. Following resuscitation with intravenous fluids, correction of electrolyte imbalance and anaemia, nasogastric suction, ensuring adequate urinary output, and administration of intravenous antibiotics, exploratory laparotomy was performed on all 32 patients through a right transverse subumbilical incision. Midline incision was not routinely employed in the unit and so it was not used in any of these patients. The wound edges were wrapped with abdominal packs and the faeculent material was effectively drained to minimize gross contamination of the wound edges. The intestinal perforations were closed using the procedure best suited for the pathology and condition of the patient. The peritoneal cavity was irrigated with warm normal saline and mopped dry.

The wounds were closed in layers; the anterior rectus sheath was approximated using a simple continuous technique with 3/0 vicryl or nylon sutures. Subcutaneous tissue was irrigated with warm saline, while the wound edges were routinely scrubbed with saline-soaked gauze without excision. The skin and subcutaneous tissue were then closed primarily in all cases with 3/0 vicryl suture inserted at intervals. The wounds were routinely inspected on the third to fifth postoperative days for any evidence of SSI. SSI was defined as "a break in the skin or mucous membrane due to surgery, which is discharging pus" as adopted by the National Research Council of the United States of America.[1] In the event of such infection, some sutures were removed to allow free egress of the purulent wound discharge, followed by daily wound dressing with Edinburg University Solution of Lime (EUSOL) or honey. Wound culture and sensitivity were performed where there was a spreading infection and the available results used to assess the antimicrobial therapy to be administered. Intravenous ceftriazone and metronidazole were the antibiotics of first choice, except in a few indigent patients for whom a combination of chloramphenicol, metronidazole, and genticin was employed. None of the children's antibiotic protocols were changed on account of the culture results. Secondary closure was performed where the wound failed to heal spontaneously after the infection had been controlled. Nutritional rehabilitation was employed in those found to be clinically malnourished. Other complications documented in the case notes were noted.

RESULT

There were 38 patients with typhoid ileal perforation who had surgery with primary closure of their wounds over the ten year period. Their ages ranged from <1 year to 15 years (median = 12 years) [Table 1]. Six patients died within 48 hours of surgical intervention before SSI could be established, and were excluded from the study. Of the remaining 32 cases, there were 18 males and 14 females (M: F= 1.3:1) [Table 2].

All the patients had established symptoms and signs of generalised peritonitis and abdominal distension. There was, however, no record of any case of anterior abdominal wall oedema in any of the 32 patients. Radiological evidence of pneumoperitoneum was present in nine (28.1%) patients. The estimated period from the time of perforation, heralded by the onset of sudden abdominal pain, to surgery, ranged between ≤ 24 h–4 days, with an average of 2.5 days. The majority (90.6%) of the patients (29/32) had laparotomy performed between ≤ 24–48 h of admission.

Single perforations (68.8%) were the predominant finding; the highest number of perforations in a single patient was three, all limited to the terminal 60 cm of the ileum. The mean volume of faeculent material drained was 897.9 mL (range 100–3000 mL).

In all, only 18.8% of the wounds (in six patients) healed primarily and without complication. There were 19 cases of SSI, with an infection rate of 59.4% (19/32 cases). The mean interval between operation and onset of wound infection was 5.6 days. Of the infected wounds, pathogenic organisms were cultured in only six, with a microbial wound infection rate of 18.8% (6/32 wounds). The majority of the isolates were endogenous organisms such as Escherichia coli, Klebsiella, and Proteus spp from five patients and Staphylococcus aureus in the remaining one patient.

All (59.4%) the infected wounds (19/32 wounds) healed

Table 1: Age distribution of patients

Age (years)	Frequency (n)	Percent
1–3	1	3.1
4–6	0	0.0
7–9	8	25.0
10–12	13	40.6
13–15	10	31.3
Total	32	100%

Table 2: Sex distribution of patients

Sex	Frequency (n)	Percent
Male	18	56.2
Female	14	43.8
Total	32	100%

spontaneously when some sutures were removed to allow egress of the purulent wound discharge followed by daily wound dressing. Secondary wound closure was employed in only five patients who had abdominal wound dehiscence. These also required nutritional rehabilitation as well as correction of anaemia. There was no record of the retroviral status in any of the 32 patients.

Other complications documented in the case notes are as shown in Table 3.

There were three deaths which occurred in the second postoperative week due to overwhelming sepsis. One of these patients was re-operated for an uncontrolled faecal fistula. The mean duration of hospital stay in the survivors and nonsurvivors was 25.5 and 15 days respectively.

Table 3: Distribution of postoperative complications

Complication	Frequency (n)	Percent of total patients
Superficial wound infection only	17	53.1
Superficial wound infection + intraabdominal abscess	2	6.3
Abdominal wound dehiscence	5	15.0
Faecal fistula	2	6.3

DISCUSSION

Delayed primary closure of dirty wounds in which approximation of the wound margins is left for about five days after operation, has been the accepted practice.[2,3] The rationale is that the open wound allowed free egress of purulent wound discharge resulting in a decreased risk of bacterial colonization.[4] However, an open surgical wound which is awaiting delayed primary closure is frightening and causes anxiety to both parents and children.[6] This is the reason why many surgeons continue to perform primary closure of such wounds.

Our results showed that despite contamination of the abdominal wounds by faeculent peritoneal material at laparotomy for typhoid perforation, primary wound healing without any complication still occurred in one-fifth of the wounds. This was in agreement with other studies.[6,7] The rate of postoperative SSI recorded in this study, though similar to the finding by Ameh,[7] was lower than those recorded in other series.[8,9] SSI was the most frequent complication encountered in this series as previous studies.[7-10], We observed that all the infections were superficial and the wounds healed spontaneously after some sutures were removed to permit exit of purulent wound discharge, followed by daily wound dressing. This was also the experience of others.[6] This observation made primary closure of dirty wounds appear more attractive than the conventional delayed primary closure, which is painful and inflicts both psychological and physical trauma on the child [6,11]. From the results of several recent studies, delayed primary closure of wounds has no benefit over primary closure in terms of SSI rates.[6,12]

The mean interval between operation and onset of a SSI as well as the microbial pattern of the wound culture examination in this study agreed with those reported by Adesunkanmi *et al.*[6] Endogenous organisms such as *Escherichia coli, Klebsiella,* and *Proteus* spp were the predominant isolates. This agreed with the findings by Bunweit *et al.*[11] that the bacteria cultured from laparotomy wounds were almost always the same ones present in the peritoneal cavity.

The pattern of other postoperative complications in this report was similar to those in other series[7-10] A few cases of abdominal wound dehiscence necessarily required secondary wound closure in this series as was the case in other series.[6,13]

About 87.5% of the survivors (28/32 cases) were school children and adolescents; this can have a devastating socio-economic impact as these children would drop out from school while their parents abandon their jobs to care for them in hospital.

In conclusion, abdominal wounds following typhoid perforation, though classified as dirty, can be closed primarily with good healing outcomes. Deligent and aggressive wound management, often involving multidisciplinary approach, will reduce the incidence of wound sepsis and its associated morbidity and costs.

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