

Factors affecting outcome of emergency paediatric abdominal surgery

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Abstract

Background: Paediatric surgical abdominal emergencies are important causes of morbidity and mortality in children. None of the previous studies on abdominal surgical emergencies specifically addressed the problem as it affects children.

Materials and methods: An eight-year retrospective review of all children aged 0-15 years who presented with acute abdominal emergency.

Results: Two-hundred and fifty-one (251) children, male to a female ratio of 1.5:1 and median age of Presentation of 78 months (range 1day to 15years). The median duration of symptoms before presentation to hospital was 96 hours. The median duration between admission and surgical intervention was 24hours. Intestinal obstruction accounted for 87 (34.7%) of acute abdominal emergency. This was the commonest emergency encountered overall. Typhoid perforation (TP) was responsible for 71 (28.3%) of all acute abdominal emergencies and was the commonest condition encountered in children above the age of one year. Others included 55 (21.9%) cases of appendicitis, 18 (7.2%) of abdominal trauma, 6 (2.4%) anterior abdominal wall defects and 5 (2.0%) each for infantile hypertrophic stenosis and primary peritonitis. Postoperative complications were observed in 85 (33.9%) of patients. The commonest complications were wound infection 31 (12.4%) and wound dehiscence 23 (9.2%), while mortality rate was 16% overall, and 31.8% in the neonatal period. Overwhelming sepsis was responsible for 26(63.4%) of all deaths recorded. Multiple congenital anomalies were the cause of death in 5(12.2%). Other causes of death were prolonged ileus with malnutrition in 4 patients, respiratory insufficiency in 2 patients and a patient each died from necrotising enterocolitis, acute renal failure, enterocutaneous fistula and over hydration.

Conclusion: Intestinal obstruction was the commonest acute abdominal emergency in children. The high rates of postoperative morbidity and mortality observed could be attributed to delayed presentation to hospital.

Key words: Paediatric, emergency, abdominal surgery, outcome

Introduction

Although there have been reports on abdominal surgical emergencies from various parts of Nigeria^{1, 2} and Africa,³ none of these reports addressed the problem as it affects the paediatric age group. Due to the emphasis on communicable diseases and malnutrition in children, little attention has been given to the surgical care of children in sub-Saharan Africa.⁴ The epidemiology of paediatric surgical emergencies will define the problem as a significant health care problem and this will likely facilitate intervention by health care policy makers in ensuring the provision of adequate resources. It is also important in the area of training both medical students and trainee surgeons.

The purpose of this report is to define the spectrum of paediatric surgical abdominal emergencies and document the factors that contribute to the outcome of treatment in 251 patients presenting between January 1994 and December 2001 to the University of Ilorin Teaching Hospital (UITH), Ilorin, Kwara State Nigeria.

Materials and Methods

A retrospective study of all children aged one day to fifteen years presenting to the UITH with an abdominal surgical emergency and who had emergency abdominal operations between the period of January 1994 and December 2001 was carried out. All cases that were managed non-operatively were excluded in this study.

Information extracted from the case notes include the age, sex, diagnosis, the time interval between onset of symptoms and presentation to hospital and the time interval between presentation to hospital and surgery. Others included, the status of the operating surgeon, the outcome of treatment and the duration of hospital stay.

Results are expressed as simple percentages, mean value \pm standard deviation or median value where necessary. The independent t-test was used to determine statistical significance between delayed presentation to hospital, delayed surgical intervention and the outcome in terms of morbidity and mortality. $P < 0.05$ was considered statistically significant.

Results

Two hundred and eighty (284) four children aged one day to 15 years with acute abdominal conditions had emergency abdominal surgery during the period under review. 251 of these patients had adequate medical records. There were 149 boys and 102 girls. The youngest patient was a day old and the oldest 15 years. The median age at presentation was 78 months. Duration of symptoms at presentation ranged from four hours to two weeks (336 hours) with a median of 96 hours and the interval between admission to hospital and surgical intervention range from three hours to 72 hours, with a median of 24 hours.

Indications for emergency abdominal surgery

Overall intestinal obstruction was the commonest indication for emergency abdominal surgery (EMABDS) in 87 (34.7%) patients. This was followed by typhoid perforation (TP) 71 (28.3%) and appendicitis 55 (21.9%) of patients. Details are shown in table 1.

Considering the different age groups, in the neonatal period (0-28 days) congenital intestinal obstruction was responsible for 35 (80%) of all EMABDS. Anorectal malformations and intestinal atresia being responsible for most of the cases (30 out of 35) of intestinal obstruction seen in this age group. 17 patients with anorectal malformations and 7 with Hirschsprung's disease had a temporary colostomy. Of the

14 patients with intestinal atresia, five with duodenal atresia had duodeno-duodenostomy. Two out of these five patients with duodenal atresia had additional anomalies with one having oesophageal atresia while the other had intestinal malrotation. Of the remaining patients with intestinal atresia, seven had jejunal and two ileal atresia. All these patients with jejuno-ileal atresia had resection and end to back anastomosis. There were six patients with anterior abdominal wall defects. Five with minor exomphalos had fascial closure of defect and a patient with gastroschisis had improvised silo placement. Patients with large defects were managed non-operatively and therefore not included. There were two neonates with evisceration of intestines through a normal umbilicus. These followed burns sustained from application of hot water or heated stone fomentation for the treatment of the umbilical stump. In infancy (>28days - 1year), also intestinal obstruction was the commonest 38 (84.5%) indication for EMABDS and intussusception was responsible for 28 (82.4%) of all intestinal obstruction seen in this age group. Twenty-three of all patients with intussusception had operative manual reduction while 11 (32.4%) had resection and anastomosis for gangrenous bowel. Four patients with infantile hypertrophic pyloric stenosis also presented in this age group and underwent pyloromyotomy. Another patient, a six week old presented with evisceration of gut through the umbilicus sustained from fomentation of the umbilical stump. This patient and the two others had laparotomy and closure of the fascial defect.

In the older children (>1year - 15 years), TP was the commonest indication for EMABDS 71 (43.8%). The youngest child with TP was 3 years old. In two of the 71 patients with TP, the gall bladder was involved with multiple perforation and the two patients had emergency cholecystectomy. Sixty-seven of the

remaining patients had laparotomy and simple closure of the perforations. Segmental resection and anastomosis was done in two further patients with multiple perforations close together. Appendicitis was the second commonest 55 (33.7%) abdominal emergency in this age group and in 35 (63.6%) of cases the appendix had perforated prior to presentation. The youngest patient with appendicitis was three years old and there were only 2 patients with appendicitis below the age of five years. Twenty five patients were offered appendicectomy through a Lanz incision while the remaining 30 patients had appendicectomy through a laparotomy because of generalised peritonitis. Fifteen patients had abdominal trauma in this age group. Abdominal trauma was blunt in 10 patients and penetrating in five patients. Thirteen of the patients were involved in a pedestrian vehicular accident. In the remaining two patients one had gunshot injury and the other fell from a tree. The commonest organ involved was the spleen in seven patients. Others were the small bowel in 5 cases, the stomach in 2 cases and the liver in 2 cases.

Complications and mortality

There were 99 complications in 85 (33.9%) patients. The complication rate varied according to the indications for surgery (Table 2). Wound infection 31 (12.4%) and wound dehiscence accounted for 23 (9.5%). Other complications include intra-abdominal abscess 10 (4.0%), post-operative adhesions 10(4.0%), broncho-pneumonia 8(3.2%), enterocutaneous fistula 6(2.4%), prolonged ileus 4(1.2%), anastomotic dehiscence 3, acute renal failure 2 and necrotising enterocolitis in one patient. The median duration of hospital stay was 13 days (range 1 - 137 days). There were 41 deaths in our series of 251 cases, a total mortality of 16.0%. The mortality in the neonatal period was 31.8% and account for 34.1% of all deaths recorded. Overwhelming sepsis was responsible for 26 (63.4%) of the deaths.

Table 1: Indications for emergency abdominal surgery in different age groups in children

Indications	Age group (Years)			Total (%)
	< 1 month	< 1	1 - 15	
Intestinal obstruction	35	38	14	87(34.7)
Intussusception	0	28	6	34
Anorectal malformation	16	1	0	17
Intestinal atresia	14	0	0	14
Obstructed hernia	2	3	5	10
Hirschsprung's disease	3	3	1	7
Midgut volvulus	0	3	0	3
Post operative adhesions	0	0	1	1
Ileo-sigmoid knotting	0	0	1	1
Typhoid perforation	0	0	71	71 (28.3)
Appendicitis	0	0	55	55 (21.9)
Abdominal trauma	2	1	15	18 (7.2)
Primary peritonitis	0	0	5	5 (2.0)
Infantile hypertrophic pyloric stenosis	1	4	0	5 (2.0)
Exomphalos	5	0	0	5 (2.0)
Gastroschisis	1	0	0	1 (0.4)
Miscellaneous	0	1	3	4 (1.6)
Pyonephrosis	0	1	0	1
Twisted ovarian cyst	0	0	1	1
Perforated jejunal lymphoma	0	0	1	1
Intrapelvic sacrococcygeal teratoma	0	0	1	1
Total	44	44	163	251(100)

Table 2: Morbidity and mortality pattern among the major indications for abdominal emergency surgery in children.

Indication	No.	Complication rate (%)	Median duration of hospital stay (days)	Case fatality
Typhoid perforation	71	55.0	19	16.9
Simple appendicitis	20	5.0	6	0
Complicated appendicitis	35	48.6	12	5.7
Intussusception	34	44.1	12	23.5
Abdominal trauma	18	33.3	7	0
Anorectal malformations	17	41.2	14	17.6
Intestinal atresia	14	71.4	20	50.0

Multiple severe anomalies caused death in 5(12.2%) patients. Other causes of death include prolonged ileus with malnutrition

4, respiratory insufficiency 2, necrotising enterocolitis, acute renal failure, enterocutaneous fistula and

overhydration were responsible for the death of one patient each. TP, intussusception and intestinal atresia were responsible for most of the deaths (68%) (Table 2). The mortality was significantly affected by delay in presentation ($P=0.001$) and prolonged interval between admission and surgery ($P=0.04$).

Discussion

Intestinal obstruction was the commonest surgical abdominal emergency in children in the University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria. This corroborated the findings of earlier workers^{3, 5} but whose series also included adult patients. However, appendicitis was the commonest abdominal emergency in Ibadan and Port Harcourt,^{1, 2} Nigeria, even though patients of all ages were included in their series. In North America appendicitis is also the commonest abdominal condition requiring emergency surgery in children.⁶ The contribution of intestinal obstruction in emergency abdominal surgery is more pronounced in the neonatal period and infancy. In the neonatal period anorectal malformations and intestinal atresia were the leading causes of intestinal obstruction in our series and that of others^{7, 8}. Intussusception was the premier cause of intestinal obstruction and indication for emergency abdominal surgery in infancy. However, in the older children TP claims a pride of place as the commonest acute abdominal condition requiring surgery in our centre. This undue prominence of TP appears to be peculiar to our centre as none of the earlier reports revealed any significant impact of TP in EMABDS.^{1, 2, 3} We have recently reviewed this problem of TP in children in our hospital.⁹ An interesting finding in this series was typhoid perforation of the gall bladder. Two of the 71 patients with TP who presented with clinical features indistinguishable from TP of ileum were found to have multiple perforations of the

gall bladder. There were no calculi either in the gall bladder or the bile duct. Both patients had emergency cholecystectomy. Acalculous cholecystitis is known to be associated with typhoid fever.¹⁰ Appendicitis was the next commonest acute abdominal condition. There were only two patients in our series below the age of five years, the youngest 3 years old. Appendicitis is known to be uncommon in the neonatal period and infancy.¹¹ This relative rarity may be due to paucity of lymphoid follicles in the submucosa of the appendix in this age group. The base of the appendix is relatively wide and the risk of developing appendicitis low. Two thirds of the patients with appendicitis in our series were complicated. They were responsible for the long hospital stay and the mortality observed. A straightforward acute appendicitis presenting early, promptly diagnosed and treated by surgery should have an uneventful course. The delay in presentation with advanced disease is usually responsible for the increase morbidity and sometimes mortality.^{12, 13}

In accordance with previous reports on abdominal trauma in children the spleen was the commonest organ involved and blunt abdominal trauma the commonest mode of injury.^{1, 14, 15} An interesting finding was in three of the patients who sustained full thickness thermal injury over the umbilicus. All three had evisceration of the intestines through the resulting defect. The injuries were sustained from fomentation of the umbilicus either using clothes soaked in hot water or covering heated stones with wet clothes. This is a cultural practice from this part of Nigeria for the treatment of the umbilical cord. Although Owa et al¹⁶ reported on this practice causing periumbilical cellulitis none of their patients presented with evisceration of abdominal contents.

Intrabdominal abscess and peritonitis was found in five patients, two boys and three girls. Except for an inflammation of the terminal ileum in two of them there

was no perforation or pathology in any other organ. Also none of these patients had any underlying medical disorder. In girls primary peritonitis with no clear aetiology is presumed to be related to the retrograde passage of organisms through the genital tract.¹⁷ In Ajao's¹ series there were 11 of such patients with 'idiopathic' intrabdominal abscess.

The high morbidity and mortality observed in this series is related to delay in presentation to hospital. This is evidenced by the high resection rate in cases of intussusception and the large proportion of patients with complicated appendicitis. The mortality in the neonatal age group was about twice the overall mortality. However, the neonatal mortality rate is comparable to a previous study that considered all neonatal surgical emergencies.¹⁸ This higher mortality in this age group apart from late presentation is contributed by the absence of supporting facilities for neonatal intensive care and total parenteral nutrition (TPN). Four of our patients with intestinal atresia died 2 to 3 weeks post-operative from inanition as a result of prolonged ileus. Our mortality for TP and intussusception appears to be decreasing when compared to previous reports from the same hospital.^{8,19}

Parental ignorance, social beliefs and customs, the tendency to try home remedies first, easy availability of drugs including antibiotics due to their uncontrolled sale or patronage of private medical practitioners without adequate facilities leads to the children being brought to the hospital as a last resort and with the child in extremis.²⁰ Therefore to reduce this unacceptable morbidity and mortality a concerted effort on health education should target the populace on the serious impact of abdominal pain and the consequences of delay and also where help will be available. To the Health workers (including physicians), there is a need for continuing medical education. The attention of the government needs to be drawn on the extent of the health problem,

and the need to provide adequate facilities to our hospitals.

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