

Non-trauma related paediatric abdominal surgical emergencies in Lagos, Nigeria: Epidemiology and indicators of survival

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ABSTRACT

Background: Pediatric surgical emergencies are associated with higher morbidity and mortality. The aim of this study is to describe the epidemiology of non-trauma related pediatric abdominal surgical emergencies in our centre and determine the indicators for survival in a cohort of patients. **Patients and Methods:** A retrospective study of children aged 1 day to 15 years who presented with non-trauma related abdominal emergencies at the Lagos University Teaching Hospital (LUTH). **Results:** There were 129 children. The median age at presentation was 5 months (range: 1 day-15 years). There were 104 males and 25 females. Sixty-four (49.6%) patients presented within 48 hours of the onset of the symptoms while 65 (50.4%) presented after 48 hours. Intestinal obstruction is the commonest indication for pediatric emergency surgery in our centre accounting for 76 patients (58.9%). Appendicitis is the second most common indication for emergency surgery with 13 patients (10.1%). Thirteen patients (10.1%) had postoperative complications. There were 13 deaths in all (10.1% mortality rate). Eleven out of 43 (25.6%) neonates died compared with 2 (2.3%) out of 86 patients in the other age groups ($P=0.002$). Seven out of 107 (6.5%) patients that had surgery within 72 hours died while 5/22 (22.7%) patients died who had surgery after 72 hours ($P=0.003$). There were 4 mortalities (28.6%) among patients with postoperative complications compared with 9 (7.8%) mortalities among 116 patients without any postoperative complications ($Pp=0.001$). **Conclusion:** Intestinal obstruction is the commonest pediatric surgical emergency seen in LUTH. Neonatal age, admission to surgery intervention time >72 hours, and severe postoperative complications are associated with high mortality.

Key words: Epidemiology, pediatric surgical emergencies, survival factors

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INTRODUCTION

Paediatric surgical emergencies are associated with higher morbidity and mortality compared with elective surgeries in developing countries.¹ Late presentation and lack of intensive care have been the major factors proposed by some authors from Nigeria to be responsible for the higher mortality seen in pediatric surgical emergencies.^{1,2}

In such a setting like ours, pediatric surgical emergencies

remain a challenge to surgeons and several factors may be responsible for the higher morbidity and mortality in emergency cases. The need to make prompt and accurate diagnosis with limited diagnostic tools is a major task.³ Even when the diagnostic equipment and personnel are available as is the case in many tertiary health institutions, poverty on the part of the parents may make such tools useless as they may not be able to afford the cost and health insurance is yet to have a firm footing in Nigeria. This leads to unnecessary but avoidable delayed surgical intervention intervals with poor outcomes. In addition, patient factors such as age at presentation and the primary pathology necessitating surgery may contribute to the high mortality in this group of patients.

The aim of this study is to describe the epidemiology of no traumatic pediatric abdominal surgical emergencies in our centre and determine the indicators for survival in a cohort of patients.

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PATIENTS AND METHODS

This is a retrospective descriptive study to document the epidemiological characteristics of pediatric patients with nontraumatic abdominal emergencies and elucidate the factors responsible for survival among this cohort of patients.

All patients from birth to 15 years presenting with nontraumatic emergencies to the Paediatric Surgical Unit of the Lagos University Teaching Hospital, Idi Araba, Lagos who required surgical intervention were recruited into the study. The case notes, charts, operative notes and admission-discharge records were retrieved for data extraction.

The study period was from January 2009 to December 2010. Patients with traumatic injuries who required surgeries were excluded from the study as well as those who have had surgery at a peripheral centre for the condition before being referred to us for reoperation as the management prior to presenting to our facility could not be ascertained.

Data including the age, gender, duration of symptoms, diagnosis, time interval between admission and surgical operation, complications of surgery and final outcome were entered into a proforma by surgical trainees in the unit.

The factors analyzed to determine survival included duration of symptoms before presentation, age of the patient at presentation; time interval between admission and surgical intervention and complications from surgery. The data was analyzed using Statistical Package for Social Sciences (SPSS®) version 16.0. Chi-square tests were performed to compare categorical variables and Student *t*-test was used to compare continuous variables. A *P* value of <0.05 was considered statistically significant.

RESULTS

There were 129 children who had complete records for analysis. The median age at presentation was 5 months (range: 1 day–15 years). There were 104 males and 25 females (M:F ratio approx 4:1). Table 1 shows the age, gender and mortality distribution of the patients.

Sixty-four (49.6%) patients presented within 48 hours of the onset of the symptoms while 49 (38.0%) presented after 48 hours but within a week of onset of symptoms. The remaining 16 patients (12.4%) presented after a week of the onset of symptoms.

The diagnoses are shown in Table 2. Intestinal obstruction is the commonest cause of non trauma related pediatric surgery emergency in our centre accounting for 76 patients (58.9%). Appendicitis is the second most common

condition with 13 patients (10.1%), followed by anterior abdominal wall defects (ruptured omphaloceles and Gastroschisis) which accounted for 9 patients (7.0%). Others are as shown in Table 2. The causes of intestinal obstruction are shown in Figure 1. The diagnosis did not affect outcome (*P*=0.591)

The median interval between admission to emergency room and surgery was 52 hours (range 3–120 hours). One hundred and seven patients had surgical intervention within 72 hours while 22 patients had surgery after 72 hours.

Table 1: Age, sex, and mortality distribution of patients

Age group	Sex		Total
	Male (died)	Female (died)	
0-1 month	36 (7)	7 (4)	43 (11)
1-12 month	39 (2)	10 (0)	49 (2)
13-60 month	14 (0)	3 (0)	17 (0)
61-120 month	10 (0)	5 (0)	15 (0)
121-180 month	5 (0)	0 (0)	5 (0)
Total	104 (9)	25 (4)	129 (13)

Table 2: Frequency of diagnosis of patients with nontraumatic paediatric surgical abdominal emergencies

	Frequency	Percent (%)
Intestinal obstruction	76	58.9
Appendicitis	13	10.1
Ant abd wall defects	9	7.0
Bladder outlet obstruction	7	5.4
Tracheoesophageal fistula	6	4.7
Typhoid perforation	4	3.1
Infantile hypertrophic pyloric stenosis	3	2.3
Penile injury	2	1.6
Neonatal necrotizing enterocolitis	1	0.8
Rectal prolapse	1	0.7
Total	129	100.0

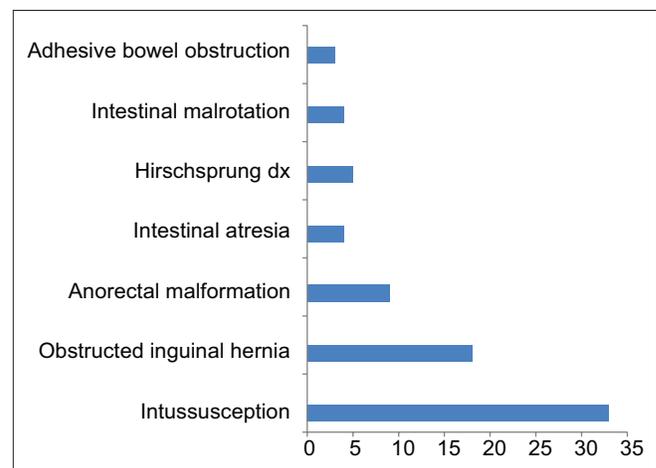


Figure 1: Diagnoses of causes of intestinal obstruction

Thirteen patients (10.1%) had complications following surgery as shown in Figure 2.

There were 13 (10.1%) deaths in all. Seven (6.5%) deaths occurred among 107 patients who had surgery within 72 hours while 5 (22.7%) deaths occurred among 22 patients who had surgery after 72 hours ($P=0.013$).

Eleven (25.6%) of 43 neonates died compared with 2 (2.3%) of the 86 patients in the older age groups ($P=0.002$). Of the 13 patients with post operative complications, there were 4 mortalities (28.6%) compared with 9 (7.8%) mortalities among 116 patients without any post operative complications ($P=0.001$).

There were 9/104 (8.7%) deaths among boys compared with 4/25 (16.0%) among girls however, this was not statistically significant ($P=0.530$).

Thus, indicators of survival include age >1 month, admission-surgery interval <72 hours and no postoperative complications.

DISCUSSION

Paediatric surgical emergencies are associated with increased morbidity and mortality when compared with elective surgeries for children.^{1,2} This is due, in part, to the primary pathological conditions requiring surgery. In the neonatal period, these conditions are often congenital while with increasing age, acquired conditions become more prevalent.^{1,3} In addition, delayed presentation to healthcare facilities and delay in diagnosis have been found to contribute to the increased morbidity and mortality in these patients in many developing countries.^{1,2} In this study, the authors sought to determine the indicators of survival in patients who required emergency surgical intervention.

The epidemiological characteristics are similar to earlier reports from Nigeria with respect to male preponderance and commonest diagnoses, although our male to female ratio of 4:1 is higher than that from Ilorin.¹ Intestinal obstruction remains the commonest indication for surgery in children in Nigeria as this study has confirmed previous reports from Nigeria.^{1,2} In the neonatal period, it is due to anorectal malformation, Hirschsprung's disease or atresias.⁴⁻⁶ In the older age groups, it is due to intussusception, obstructed inguinal hernias and post operative adhesions.^{5,6} In our series, typhoid perforation of the intestines as a cause of pediatric emergency constitutes only 3.3% of our patients compared to 28.1% in Ilorin. The reason for this may be due to the cosmopolitan nature of Lagos, where our centre is located, with better environmental sanitation systems.

This study has shown that neonatal age, admission to surgery interval of >72 hours and postoperative complications are associated with higher mortality.

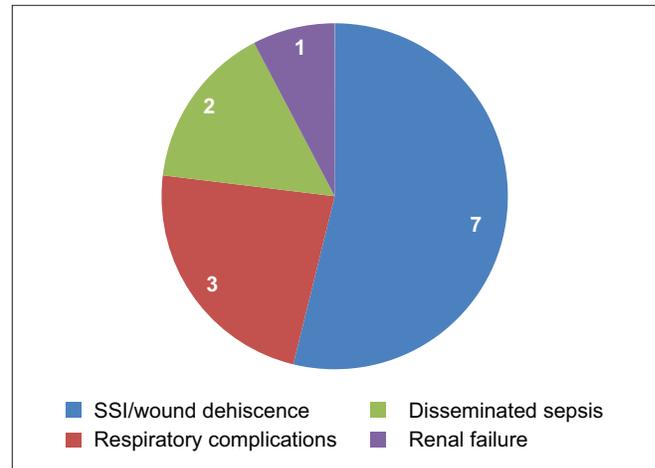


Figure 2: Post operative complications

Neonates have intrinsic challenges related to the transition from the foetal life to post natal life.⁷ These include increased susceptibility to infections, hypocalcaemia, hypoglycaemia and poor cardiovascular reserves (and thus do not tolerate blood loss like adults or older children do). Similarly, they are prone to extravascular fluid overload and wound healing is a major metabolic task. As a result, challenges from the trauma of surgery distort the delicate balance and make them susceptible to sepsis, dyselectrolytaemias, anaemia and nutritional deficits and respiratory complications. In developed countries, these challenges have been overcome largely by technologically driven neonatal intensive care units, total parenteral nutrition and extra-corporeal membrane oxygenation when required. In developing countries like ours where these are not available, neonatal surgery remains a high risk with associated high mortality rates.⁸⁻¹⁰ Therefore, it is to be advocated that neonates should only be operated upon by specialist Paediatric Surgeons and efforts at adequate resuscitation and meticulous monitoring should be ensured to improve surgical outcomes in them.

Early presentation to hospital as a positive factor in preventing morbidity and mortality in children is predicated on the fact that this translates to early surgical intervention. However, hospital systems may delay surgery even when diagnoses have been made. For example, lack of operating theatre space, lack of patient compatible blood or delay in retrieving diagnostic results can result in unnecessary delay with untoward consequences. Furthermore, in developing economies like that of Nigeria, parents cater for the health care costs of their children and wards. This sometimes results in unnecessary delay in intervention as it may take hours and sometimes days to raise enough funds for diagnostic tests or surgeries. While in our centre, funds for emergency surgery is waived in order to obviate such obstacles (although it is incorporated into total hospital costs at discharge), cost of diagnostic tests are not. As a

result, the median admission to surgery interval is 52 hours in this study. It is a worthwhile endeavor to encourage hospitals to waive both surgical fees and cost of diagnostic investigation in all cases of emergencies especially in vulnerable groups like children. Such policy should have a positive impact in the reduction of admission to surgery intervention time and potentially on the ultimate survival.

Recent evidence also suggests that in some emergency cases such as appendicitis, surgery before, and after, 12 hours have similar results.^{11,12} This finding underscores the need to adequately resuscitate patients properly prior to surgery. From our study, surgery within 72 hours is associated with better survival compared with longer duration. While efforts need to be made to reduce the admission to surgery interval, lack of pediatric intensive care facilities necessitates adequate preoperative resuscitation to ensure best surgical outcomes.

Morbidity from surgery can result in higher mortality. All the patients with severe complications such as septicaemia and severe respiratory infections died in this series while none of those with surgical site infections died. Some of the patients without complications from surgery died and this is thought to be related to their primary diagnosis. Although in this study, the mortality was not influenced by the diagnosis, this may be due to the small sample size and hence insufficient power to detect small differences in this particular variable.

Avoiding sepsis, especially in neonates is vital to survival.¹⁰ The overall mortality rate of 10.1% from our centre is less than that of Abubakar¹ (16%) in Nigeria and Mhando³ in Tanzania (34%) while it comparable to that of Abantanga¹³ in Ghana (9.7%).

This study has confirmed earlier reports on the epidemiology of pediatric surgery emergencies in Nigeria. Intestinal obstruction remains the commonest indication for surgery in the pediatric population. Therefore, there should be a low threshold to refer a child with symptoms of intestinal obstruction to the Paediatric Surgeons by Pediatricians and General Practitioners who usually encounter these patients first.

In conclusion, neonatal age, delayed admission to surgery intervention time >72 hours and severe post-operative complications are associated with high mortality. Efforts should be made to develop neonatal intensive care units and make total parenteral nutrition available to improve

survival in the neonatal period. Hospital management Systemic bureaucracy should be overhauled to reduce the admission to surgery interval while preventable complications of surgery must be avoided.

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