Original Article

Acute Mechanical Intestinal Obstruction in Children at Zinder National Hospital, Niger: Aetiologies and Prognosis

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Abstract

Background: To describe the aetiological and prognostic aspects of acute mechanical intestinal obstruction (AMIO) in children at Zinder National Hospital (Niger). **Materials and Methods:** This was a cross-sectional study on a period to January 2013–June 2015. The database included all children under 15 years of age with a surgical diagnosis of mechanical intestinal obstruction. $P < 0.05$ was considered statistically significant for analysis. **Results:** AMIOs represent 21.78% ($n = 78$) of child digestive surgical emergencies ($n = 358$). Median age was 12 months (range: 1 day–15 years). Fifteen (19.23%) were neonates and sixty children (76.92%) had ≤60 months. The sex ratio (male/female) was 2.8. The mean time from onset to presentation was 39.96 ± 36.22 h. Intussusception and strangulated hernias were the main causes of AMIO with, respectively, 43.59% ($n = 34$) and 29.48% ($n = 23$). Anorectal malformations represent 17.95% ($n = 14$) of cases of AMIO. Intestinal resection was made in 22.08% and colostomy in 19.23% of patients. The average length of hospital stay was 6.44 ± 4.30 days. The post-operative complications were recorded in 26 patients (33.33%), mostly surgical site infections. Overall mortality of AMIO was 15.38% ($n = 12$). It was higher in the neonates (33.33%) ($P = 0.032$). Deaths were associated with delay of admission ($P = 0.0005$) and waiting time for surgery ($P = 0.019$). **Conclusion:** Intussusception and strangulated hernia are the most common cause of AMIO in children. Diagnostic and therapeutic delays, lack of paediatric intensive care and post-operative complications are prognostic factors.

Keywords: Emergency, intestinal obstruction, low-income country, Niger, paediatric surgery, prognosis

Introduction

Acute intestinal obstruction (AIO) in children is a common cause of paediatric surgical emergency.[1-4] Causes of AIO not only vary from neonatal period to older children but also based on geographical distribution.[3,5,6] In the advanced countries, the prognosis is improved by rapid diagnosis and quality of perioperative care.[3,6-8] Contrariwise, in sub-Saharan Africa and other developing countries, delay in admission or management, lack of neonatal and paediatric intensive care, hard access to hospital and limited resources have been responsible for the poor prognosis of AIO.[1-5,8-10] The aim of this study was to describe the aetiological and prognostic aspects of acute mechanical intestinal obstruction (AMIO) in children at Zinder National Hospital (ZNH) (Niger).

Materials and Methods

This was a cross-sectional study over a period of 30 months (January 2013–June 2015) at ZNH. Emergency department of this hospital received patients (children and adults) with medical and surgical emergencies of Zinder area and neighbouring regions. Zinder is a city located 900 km from the capital, Niamey (Niger). ZNH is 834-bed tertiary hospital and referral basis to the approximately 4 million people of Zinder area. Emergency department of ZNH worked full-time and had a medical and paramedical team under the supervision of a senior doctor (general surgeons, paediatric surgeon, anaesthesiologist, radiologist and others).

The database included all children under 15 years of age with a surgical diagnosis of mechanical intestinal obstruction. The non-operate children, functional bowel obstruction and those whose laparotomy found another diagnosis were excluded from

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the study. Data were collected using the registers of operating room, post-surgery, intensive care and patients records. Data concerning demographics, mode and delay of admission, waiting time for surgery, surgical procedures, duration of hospitalisation, morbidity and mortality.

Patients granted informed consents. Data collected were saved and processed with Excel and Epi Info™ 7 (CDC: Center for Disease Control and Prevention) Software. Chi-square test was used to compare qualitative variables and Mann–Whitney/Wilcoxon test to compare continuous variables. $P < 0.05$ was considered statistically significant.

Results

During the study period, 785 acute surgical abdomens (adults and children) were operated at ZNH, and a total of 358 children were managed. AMIOs represent 21.78% ($n = 78$) of paediatric digestive surgical emergencies ($n = 358$). Peritonitis ($n = 226$) was the most common, and AMIO ($n = 78$) was the second cause of abdominal emergency in surgery at ZNH.

The ages of patients with AMIO ranged from 1 day to 15 years with a median age of 12 months. Fifteen (19.23%) were neonates and sixty (76.92%) of children had ≤60 months. There were 58 males and twenty females (sex ratio M/F = 2.8) [Table 1]. Patients were from rural areas in 60.25% ($n = 47$). The mean time from onset to hospital admission was 39.96 ± 36.22 h (range: 2–240 h).

The site of bowel obstruction was colic in 66.66% ($n = 52$) of cases. Mechanism by strangulation was the most common cause of obstruction in sixty patients (76.92%). Intussusception and strangulated hernias were the main causes of AMIO with, respectively, 43.59% ($n = 34$) and 29.48% ($n = 23$). Anorectal malformations represent 17.95% ($n = 14$) of cases of AMIO. Strangulated umbilical hernias were the most commonly seen ($n = 20$) [Table 2]. The majority of intussusceptions ($n = 31$) were ileocolic type and three were ileo-ileal.

The average waiting time for surgery was 7.53 ± 3.50 h (range: 1–22 h). Intestinal resection due to bowel gangrene or intestinal perforation was made in 17 cases (22.08%) and colostomy for 15 patients (19.23%) [Table 3]. Bowel resections are due to intussusceptions in 15 cases and to strangulated hernia and volvulus in 2 cases.

The average length of hospital stay was 6.44 ± 4.30 days (range: 1–21 days).

Morbidity was recorded in 26 patients (33.33%). The most common post-operative complication was surgical site infection including wound dehiscence ($n = 6$), in 23.07% ($n = 18$) of cases. The other complications were sepsis in three cases (3.84%), respiratory distress in three cases (3.84%) and post-operative peritonitis in two patients. Overall mortality of AMIO was 15.38% ($n = 12$). It was higher in the neonatal period, five, (33.33%) out of 15 neonates died compared with seven (11.11%) out of 63 other patients ($P = 0.032$). Deaths were associated with delay of admission ($P = 0.0005$) and waiting time for surgery ($P = 0.019$). Out of the 26 patients with post-operative complications, nine died, instead of three patients in the group without complications (3/52) ($P = 0.0017$). There was no statistically significant difference in mortality between male (9/58) and female (3/20) ($P > 0.955$).

Table 1: Distribution of patients by age, sex and lethality

Age in months	Male/female	*n* (%)	Lethality
<1	12/3	15 (19.23)	5
1-24	21/10	31 (39.72)	4
24-60	11/3	14 (17.95)	2
60-120	9/3	12 (15.39)	1
120-180	5/1	6 (7.69)	-
Total (%)	78	78	12

Table 2: Aetiology of intestinal obstruction

Causes	*n* (%)	Deceased
Strangulated hernias (*n*=23)		
Umbilical hernia	20 (25.64)	-
Inguinal	3 (3.85)	-
Average age, months (range)	84 (3-180)	
Intussusception (*n*=34)	34 (43.59)	7
Median age, months (range)	12 (3-60)	
Post-operative adhesions (*n*=5)	5 (6.41)	-
Average age, months (range)	112.8±31	
Volvulus (age: 2 months)	1 (1.28)	1
Anorectal malformation (*n*=14)	14 (17.95)	4
Average age, days (range)	3 (1-12)	
Colonic atresia (age: 3 days)	1 (1.28)	
Total	78	12

Table 3: Type of operative procedure (*n*=78)

Operations performed	Number of patients (%)
Simple herniorrhaphy	21 (26.92)
Bowel resections	
Resection of the small intestine	8 (10.26)
Right hemicolectomy	9 (11.69)
Colostomy	15 (19.48)
Reduction of intussusception	22 (28.25)
Adhesiolysis	3 (3.84)

Discussion

Intestinal obstruction is a common surgical emergency worldwide.[1-3,5,11-13] AMIO in children represents the second cause of acute abdomen in our hospital, as reported by earlier study.[14] Children <5 years are most concerned.[3,5,12] Male predominance is found in most series.[2,3,5,12,15]

Main aetiologies of AMIO in children are represented by intussusceptions, occurring usually between 4 and 10 months of age.[2,3,6,9,13-16] Majority of the intussusceptions were

idiopathic and ileocolic type.[5,16,17] Idiopathic intussusception is associated with viral pathogens of gastrointestinal diseases in infancy and early childhood.[6,16,18] These agents are known to vary from one region to another and from one period to another.[6,16,17]

In this study, strangulated hernia was the second cause of AMIO and strangulated umbilical hernias are most common (25.64% of cases); worldwide, strangulated inguinal hernias were most reported.[3,5]

Parasitic aetiologies of AMIO, especially roundworms, which predominate in some series[5,19] have not been recorded in our study. In Niger, the common use and promotion of antihelminthic agents at community level for several years could explain this situation. Ascariasis is the infestation by nematode. It's a common problem in the tropics attributed to poor hygienic and low socioeconomic conditions.[3,19] Obstructed hernias ranked fourth in the list.

In this study, among neonates, AMIO represents 19.23% of cases due to anorectal malformation and colonic atresia. Because of the lack of antenatal diagnosis, newborns with anorectal malformation are admitted too late with intestinal obstruction. In this age, other congenital anomalies are implied in mechanical bowel obstruction such as bowel atresia or malrotation.[2,3,7,20-22]

In sub-Saharan African and tropical countries, children with AMIO were often admitted with delay.[2-4,8,10,14,23] If in advanced countries, the prognosis of bowel obstruction was significantly improved, in sub-Saharan African countries, from various series, lack of diagnostic capabilities may also be a contributor to high morbidity and mortality.[2,3,8,12,24] Early admission to hospital results in early diagnosis and adequate surgical management which lead to a better prognosis of AMIO.[2,8,13] In the case of Zinder Hospital, the delay in surgical treatment may also be involved in the bad prognosis of patients. Indeed, the process of care is related to several factors such as availability of blood products, delays in getting relevant laboratory results, the financial capacity of parents to honour prescriptions, inadequate technical facilities and staff negligence in the care chain.[4,10,14] This observation was made by other African studies on digestive surgical emergencies in children.[2,3,8,12,21,23]

Surgical site infections are the most common post-operative complications, while the other complications were sepsis, respiratory distress and post-operative peritonitis. These complications are often related to necrosis and intestinal perforation; they increase the hospital length of stay.[3,8]

Our overall mortality of AMIO was 15.38%. The mortality was higher in the neonatal period, and deaths were associated with delay of admission, waiting time for surgery and post-operative complications.[2,8,12,13,20,21,23] For Tambo *et al*.,[23] Overall mortality of neonatal intestinal obstruction was 37.3%. In developing countries, the prognosis remains reserved in neonatal occlusions, with a mortality rate ranged between 20% and 70% whereas this rate is <15% in developed countries.[21,23]

The morbidity and mortality of neonatal occlusion is greatly reduced with the progress of paediatric and neonatal intensive care, multidisciplinary consultation, earlier diagnosis and treatment of associated diseases.[20-23] The association of other anomalies is noted in 50%–60%. The most well-known association is vertebral, anal, cardiac, tracheal, oesophageal, renal and limb.[7]

In this study, intussusception was the most common indication for bowel resection in infants, while in the developed countries, the quality of diagnosis and precocity of the treatment have reduced considerably the number of bowel resections due to AMIO. Indications for bowel resections in developing countries are mainly from preventable causes, but late diagnosis leads to intestinal resection.[6,8,13,17,24,25] Case fatality was higher in Africa (8.1%–55%) compared to other regions (1%).[6,9,17,24] In this study, case fatality due to intussusception exceeds 20%; this confirms earlier data in Niger.[4,14,24] The delay of diagnosis and presentation might be factors to the poorer outcome of patients with intussusceptions.[14-17,21,23-25]

Conclusion

AMIOs are common surgical emergencies in children. AMIO is a major source of high morbidity and mortality. Intussusception is the most common cause in infants and small children, while anorectal malformations predominate in the neonatal period. Prognostic factors in our Nigerien context are diagnostic and therapeutic delays, lack of neonatal and paediatric intensive care and the occurrence of post-operative complications.

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Conflicts of interest

There are no conflicts of interest.

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