Determinants of mortality in neonatal intestinal obstruction in Ile Ife, Nigeria

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ABSTRACT

Background: Neonatal intestinal obstruction (NIO) is a common cause of mortality. This study determined the causes of mortality in patients with NIO at the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile Ife. **Patients and Methods:** Records of all cases of NIO managed at OAUTHC between January 1996 and December 2005 were retrospectively reviewed and the possible factors that may result in mortality were analysed. **Results:** Sixty-three neonates with intestinal obstruction were managed, representing 24.3% of the neonatal admissions during the study period. Forty-two were males and 21 were females (M:F = 2:1). The majority (71.4%) of the patients presented within the first week of life. Anorectal malformation constituted 57.1% of the causes of NIO. Other causes included Hirschsprung's disease, duodenal atresia, intestinal malrotation with midgut volvulus and jejunal atresia. There were 18 deaths, with a mortality rate of 28.6%. Reoperation, postoperative bleeding and peroperative sepsis were significant determinants of mortality. **Conclusion:** NIO is associated with significant mortality in our centre. Repeat surgery, postoperative bleeding and sepsis were the significant factors that contributed to mortality in NIO.

Keywords: Determinants, mortality, neonatal intestinal obstruction

INTRODUCTION

Significant advances in neonatal surgery have resulted in the improved survival of children with many types of congenital malformations that were formerly considered lethal. Improved obstetric care, perinatal pathological diagnoses, neonatal anaesthesia, surgical techniques and perinatal support, including paediatric intensive care and appropriate management of associated abnormalities, have all contributed to the improved survival of the surgical neonate.[1,2]

Neonatal intestinal obstruction (NIO) is a common emergency requiring surgical intervention in the newborn.[3] The management of NIO in developing countries remains challenging, with poorer outcomes compared with the results from the industrialized countries.[1,4] The mortality associated with NIO ranges between 21 and 45%[1,3-5] in developing countries, unlike the less than 15% in Europe.[2] Some factors attributing to the high mortality in developing countries include prematurity, late presentation, associated severe congenital anomalies and complications of surgery as well as lack of neonatal intensive care facilities.[1,3,5] In this study, we wanted to determine some of the factors that influence the outcome of management of NIO in a cohort of patients over a 10-year period in a tertiary health facility in a suburban Nigerian setting.

PATIENTS AND METHODS

This was a retrospective study of all neonates managed for NIO at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria, between January 1996 and December 2005. Data were collated from patients' hospital records (case notes, ward registers and theater records) and analysed for age, sex, clinical features, diagnosis, surgical procedure performed, prematurity, birth weight, duration of symptoms, complications and their management using the Statistical Package for Social Sciences (SPSS) version 13.0 . χ^2 tests were used to test the statistical significance and further confirmed using the Fisher's exact test. A *P*-value of <0.05 was assumed to be significant.

RESULTS

Seventy-four patients presented with NIO during the study period but complete records were available for only 63 patients. Within the same period, a total of

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259 neonates had surgery for various conditions, with NIO representing about 24.3% of the neonatal surgical conditions.

Of the 63 neonates who had NIO, 42 (66.7%) were males and 21 (33.3%) were females (M:F = 2:1).

A majority (71.4%) presented in the first week of life. The most common causes of intestinal obstruction in neonates in this series were anorectal malformations, accounting for 57.1% (36 patients) of the cases. Twenty-six (72.2%) patients had high anorectal malformation while 10 patients (27.8%) had low malformations. Of the high anorectal malformations, there were 17 (47.2%) cases of anal and rectal atresia with fistulae while five (13.9%) had no fistula. There were three (8.3%) cases of isolated rectal atresia.

In the patients with low malformation, eight (22.2%) had perineal fistulas while two (5.4%) had anal stenosis. One (2.7%) patient had a persistent cloaca.

Other causes of NIO included Hirschsprung's disease in 12 (19.0%) patients, small intestinal atresias in eight (12.7%), intestinal malrotation and volvulus in six (9.5%) and obstructed inguinoscrotal hernia in one (1.6%) patient [Table 1].

Table 1: Diagnosis of patients with neonatal intestinal obstruction and their mortality rates

Diagnosis	Alive n (%)	Dead n (%)	Total n (%)
High anorectal malformation	19 (73.1)	7 (26.9)	26 (41.3)
Low anorectal malformation	9 (90.0)	1 (10.0)	10 (15.9)
Hirschsprung's disease	8 (66.7)	4 (33.3)	12 (19.0)
Midgut volvulus and malrotation	5 (83.3)	1 (16.7)	6 (9.5)
Duodenal atresia	2 (40.0)	3 (60.0)	5 (7.9)
Jejunal atresia	1 (33.3)	2 (66.7)	3 (4.8)
Obstructed inguinal hernia	1 (100.0)	0 (0.0)	1 (1.6)
Total	45 (71.4)	18 (28.6)	63 (100.0)

The mean age of the postoperative survivors was 12 days (SD: 7 days) while the mean age of those who died was 8 days (SD: 5days). Eighteen (28.6%) patients died [Table 2], two of the patients had burst abdomen following colostomy formation for a high anorectal malformation (the cause of death was unknown), one patient had a combination of esophageal and rectal atresias with congenital cardiac anomaly although the type of the cardiac defect was not confirmed, three patients who had atresia (duodenal atresia in two and jejunal atresia in one) developed anastomotic leakage and died of sepsis. The only mortality from the low anorectal malformation was due to overwhelming sepsis, which complicated a wound dehiscence. Four other patients (33.3%) who had Hirschsprung's disease also died of unknown causes.

When subjected to statistical analysis, prematurity (χ^2 = 2.046, P = 0.153), birth weight (χ^2 = 1.338, P = 0.247) and duration of symptoms (χ^2 = 1.682, P = 0.195) did not significantly influence the outcome but reoperation, (^{2} = 7.078, P = 0.02) postoperative bleeding, (χ^2 = 8.914, P = 0.006) and perioperative sepsis (χ^2 = 20.193, P = 0.0001) were significant contributors to mortality [Table 2].

DISCUSSION

NIO is a common indication for surgery in the newborn. During this study period in our centre, NIO represented a quarter of the neonatal surgical

Table 2: Analysis of factors that determine the outcome of neonatal intestinal obstruction

Criteria	Alive	Dead	Total	χ^2 value	*P*-value	Fischer's test
Gestational age (n = 61)				2.046	0.153	
< 37 weeks	4	4	8			
37–42 weeks	40	13	53			
Birth weight (n = 32)				1.338	0.247	
< 2.5 Kg	7	6	13			
> 2.5 Kg	14	5	19			
Duration of symptoms (n = 57)				1.682	0.195	
< 72 h	4	4	8			
> 72 h	36	13	49			
Reoperation (n = 60)				7.078	0.005	0.02
Yes	0	3	3			
No	43	14	57			
Postoperative bleeding (n = 60)				8.914	0.003	0.006
Yes	1	5	6			
No	42	12	54			
Sepsis (n = 60)				20.193	0.0001	0.0001
Present	0	7	7			
Not present	43	10	53			

conditions seen in the hospital. There has been a sharp drop in the number of patients over the last decade as a result of the establishment of new paediatric surgical centres within the catchment previously covered by the hospital. The causes of NIO in the present study are not too different from an earlier study from the same centre,[1] although in the present review there were more cases of Hirschsprung's disease and fewer cases of atresias.

The male preponderance in this report agrees with reports from other centres.[1,5,6]

Although the present report showed over an earlier report from this centre,[3] the mortality rate associated with NIO is still very high in our setting compared with the developed countries. Reasons for the present reduction in the overall mortality may be due to the better anaesthesia services now available in the centre and the experience gained over the years in the care of these neonates.

In most developed centres, early diagnosis, including prenatal diagnosis and planned delivery in a fully equipped paediatric surgical centre, has greatly improved survival in neonates with surgical conditions. This is not so in our country where a majority of surgical neonates present very late. The scenario in this study, where the majority presented within the first week of life, is exceptional rather than the rule. Uba *et al*.[5] reported that late presentation increased the mortality rate in children with intestinal obstruction. Their experience is at variance with ours in this study probably because the causes of NIO in the two studies were different. It seems that early presentation is a reflection of the severity of the case; later presentation may be due to the less-severe lower gastrointestinal obstruction, which the neonate may tolerate. Thus, the type of surgical condition as well as the operation performed may affect the outcome.

Reoperation, postoperative bleeding and sepsis were associated with poor outcome. The increased mortality associated with reoperation may be related to repeated exposure to anaesthesia within short intervals, their immature livers not being able to sufficiently metabolise the anaesthetic drugs, some of which are hepatotoxic.[7,8]. Stress of additional surgery may also contribute to mortality in these patients, many of whom are also septic.

Sepsis contributed significantly to mortality in this report, as in other reports.[9] While our first choice of antibiotics is a third-generation cephalosporin with metronidazole, we resorted to using cheaper antibiotics in some of the patients who could not afford this expensive combination. This could have accounted for the high rate of sepsis in this study.

Prematurity also contributed to mortality in surgical neonates in this study. In most developed countries, prematurity has ceased to be an important determinant of the outcome of neonatal surgery. This is probably due to the availability of support facilities like neonatal intensive care units in the developed countries, which is lacking in many centres in developing countries.

In conclusion, reoperation and sepsis were the two major determinants of mortality in neonates with intestinal obstruction in this study. Prevention of postoperative sepsis and complications like anastomotic dehiscence and burst abdomen, which require a repeat surgery, are necessary for improved survival after surgery for NIO.

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