

# Surgical Admissions in a Newborn Unit in a Low Resource Setting, Challenges in Management and Outcomes

Opapa PI<sup>1\*</sup>, Ujuanbi AS<sup>1</sup>, Okoro PE<sup>2</sup>

<sup>1</sup>Department of Pediatrics, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

<sup>2</sup>Department of Pediatrics Surgery, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

\*Corresponding author: Opapa PI, Department of Pediatrics, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria, Tel: 234-803-707-8844; E-mail: [peaceibo@yahoo.com.au](mailto:peaceibo@yahoo.com.au)

Rec date: Jan 23, 2014, Acc date: Mar 18, 2014, Pub date: Mar 20, 2013

Copyright: © 2014 Opapa PI, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## Abstract

**Background:** Outcome in neonatal surgeries has greatly improved in developed countries due to improvements in technology, and advances in neonatal intensive care. In developing countries however, there are several challenges with neonates requiring surgeries. The increasing incidence of congenital anomalies and thus neonatal surgical admissions calls for improvement in services for such babies.

**Aim:** The study aimed to identify surgical diagnoses in newborns, challenges in management and outcomes of treatment.

**Methods:** This was a retrospective study of neonates with surgical conditions admitted into the Special Care Baby Unit (SCBU) of a tertiary health facility in Southern Nigeria over a 3 year period. Data obtained from their case notes included; age at admission, place of antenatal care, diagnoses, treatment received, challenges in management and outcome. Data were analyzed with SPSS version 16.0

**Results:** There were 132 surgical cases of 1487 admissions, giving a prevalence of 8.9%. There were 71 males and 61 females giving a M: F ratio of 1.2: 1. 80% were born outside the hospital. Mean age at presentation was 5±6.39 days (0-28). Commonest diagnoses were disorders of the digestive system (63.6%) (mainly necrotizing enterocolitis, intestinal obstruction and omphalocele), and neural tube defects (25%).

The commonest surgeries were colostomies and exploratory laparotomies. Overall mortality rate was 28.0%, of which 51.3% were post-operative. Twenty four (18.2%) discharged against medical advice mainly due to lack of funds.

**Conclusion:** The overall mortality rate was high. Delivery outside specialized centres, late presentation, lack of facilities for peri-operative care, poverty and ignorance contributed to increased morbidity and mortality.

**Keywords** Surgical admissions; Newborns; low resource setting

## Introduction

The neonatal period is a critical time for infants all over the world. It is well documented that more than 4 million newborns die globally every year with more than 98% of these deaths occurring in developing countries [1,2]. Birth asphyxia and infections are major contributors to these deaths [3]. However there are other silent contributors to these deaths which are usually not highlighted. Amongst these, are surgical diseases in the newborn.

Outcome in neonatal surgeries has greatly improved in developed countries due to better understanding of neonatal physiology, improvements in technology, and advances in neonatal intensive care [4,5]. In developing countries on the other hand, due to the burden of other childhood diseases, neonatal surgery is of low priority to health-care budget holders, thus outcomes expectedly differ from that obtainable in developed countries [6]. In many parts of sub-Saharan Africa and the rest of the developing world, there are several

challenges with neonates requiring surgeries. Some of these challenges include delivery outside hospital, delayed referral, poor transportation, and lack of appropriate personnel and facilities for intensive care [4,6]. For those who are managed surgically, post operative care poses further challenges. For example, total parenteral nutrition is not readily available or affordable for babies in whom enteral nutrition is contraindicated for long periods [4]. These problems continue to contribute to increased morbidity and mortality in neonates with surgical problems and thus overall newborn mortality. Furthermore, Resources for neonatal surgery vary hugely between the developed countries and developing countries [6]. The increasing incidence of congenital anomalies and thus neonatal surgical admissions calls for improvement in services for such babies.

The aim of the study was to identify surgical diagnoses, challenges in management and outcomes of treatment in newborns admitted into the SCBU of our institution in Southern Nigeria.

## Method

This was a retrospective study of neonates with surgical conditions admitted into the Special Care Baby Unit (SCBU) of our institution over a 3 year period (January 2010 – December 2012). The Special Care Baby Unit (SCBU) caters for sick neonates in our centre and serves as a referral centre for neonates from all parts of our region of Nigeria. All newborns with surgical conditions born in the hospital, referred from other units/hospitals or brought in directly by their parents and who require admission are admitted into the Special Care Baby Unit (SCBU) and co-managed by the appropriate surgeons and the neonatologists in the unit. Those who undergo surgery are managed in the intensive care section of the unit in the immediate post-operative period until they are stable enough to be nursed in the general ward. It is worth noting that although the National Health Insurance scheme has been introduced, many families still bear the cost of medical and surgical treatment directly.

Data were collected retrospectively from the admission registers in the unit and case files of affected babies. Babies who had surgical diagnoses at presentation and those who developed surgical problems in the course of their illnesses were included in the study. Data collected included age at admission, place of antenatal care, surgical diagnoses, treatment received, challenges in management and outcomes. Only babies whose data could be retrieved were included in the study. Excluded were babies with congenital heart diseases because at the time of the report newborn heart surgeries were not being done in our center.

Patients were grouped into social classes according to the system of Oyediji [7] using educational levels and occupation of parents. Those in Socioeconomic classes I and II were grouped as high; those in III as middle and those in IV and V as low income groups.

Outcome of treatment was classified into three groups: Discharged after treatment, Discharged against Medical Advice (DAMA), and Died in the course of treatment. Data were analyzed with SPSS version 16.0

## Results

There were 132 surgical cases of 1487 admissions, giving a prevalence of 8.9%. There were 71 males and 61 females giving a M: F ratio of 1.2: 1. The mean age of the babies at presentation was  $5 \pm 6.39$  days (0-28). One hundred and five babies (80%) were born outside the hospital and either referred or brought in directly by their parents. 21 (15.9%) were of the high income group while, 41 (31.1%) and 70(53.0%) were of the middle and low income groups respectively. Table 1 shows place of delivery and social class of parents.

Place of delivery	Number	Percent
Home	15	11.4
Maternity home	34	25.7
Private hospital	25	18.9
Traditional birth attendant	24	18.2
Our institution	20	15.2
Other tertiary health facilities	14	10.6
<b>Total</b>	<b>132</b>	<b>100.0</b>

Social class		
High	21	15.9
Middle	41	31.1
Low	70	53.0
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Table 1:** Place of delivery and social class of parents

Table 2 shows the diagnoses of patients with surgical problems. The commonest surgical diagnoses were disorders of the digestive system (63.6%). Necrotising enterocolitis and intestinal obstruction from various atresias were the highest contributors. Other GI disorders were omphaloceles, gastrochisis and obstructed inguinal hernias. Neural tube defects constituted 18.9% of the total surgical diagnoses with myelomeningocele/meningocele contributing the highest number.

Diagnoses	Number	Percent
Gastrointestinal disorders	84	63.6
Intestinal obstruction (congenital atresias)	21	15.9
Necrotizing enterocolitis	23	17.4
Omphalocele	12	9.1
Imperforate anus	13	9.8
Gastroschisis	3	2.3
Obstructed inguinal hernia	5	3.8
Cleft lip/palate	7	5.3
Neural tube defects	25	18.9
Myelomeningocele/meningocele	15	11.4
Encephalocele	4	3.0
Congenital hydrocephalus	6	4.5
Genito-urinary disorders	5	3.8
Bladder extrophy	1	0.7
Posterior urethral valves	4	3.0
Others	18	13.6
Trachea-oesophageal fistula	5	3.8
Septic arthritis	11	8.3
Multiple congenital anomalies	2	1.5
<b>Total</b>	<b>132</b>	<b>100.0</b>

**Table 2:** Surgical diagnoses of neonates admitted into the unit

Genito-urinary disorders contributed the least to the diagnoses (3.8%). Posterior urethral valves were the commonest disorders. There was one case of bladder extrophy. Amongst the other diagnoses were septic arthritis and tracheoesophageal fistulas (TOFs).

Majority of the babies with necrotizing enterocolitis (NEC) developed it in the course of their primary illnesses. The highest risk factor was prematurity (19/23; 82.6%) followed by severe birth asphyxia (3/23; 13%). Diagnoses was made clinically and confirmed radiologically in these babies. Most of the cases were managed conservatively with only a few requiring surgery. All (5/23; 21.7%) those who underwent surgery had exploratory laparotomy with bowel resection and anastomosis. Three (3/5; 60%) died post operatively. Contributors to death in all the babies were sepsis and prolonged starvation due to unavailability of total parenteral nutrition. Four babies with NEC were discharged against medical advice. Reasons given for this were lack of finances for further treatment and need to seek alternative treatment outside the hospital setting.

Amongst those with intestinal obstruction, 16 (76.2%) had surgical intervention of which 7 (43.8%) died, 8 (50%) were discharged and 1 (6.3%) DAMA. Of the 5 who did not have surgery, 2 died before surgery (late presentation, died during resuscitation) and 3 DAMA. The commonest surgeries were exploratory laparotomies with colostomies and resection and anastomoses of bowel. Late presentation, sepsis and unavailability of TPN were contributors to poor outcomes in these patients. It is worth noting that many of these babies already had established sepsis and were on antibiotics prior to surgery.

The babies with omphaloceles were all managed conservatively with daily dressings using honey. Six (50%) were discharged home, 3 (25%) who had ruptured major degree omphaloceles and had multiple congenital anomalies presented with already established sepsis and died while 3 (25%) discharged against medical advice. Two

babies with gastroschisis died pre-operatively from severe sepsis while the parents of one refused surgical intervention and DAMA

There were 5 babies with trachea-oesophageal fistulas with or without atresias, two (40%) had feeding gastrostomies, developed complications and died. Two patient discharged against medical advice. None of the babies underwent definitive surgery because at the time of this report, even though there were trained personnel, there was a lack of facilities for peri-operative care. This was also the case around the region so referral had to be outside the region or the country which necessitated DAMA in two patients because of lack of funds. The unavailability of total parenteral nutrition for these babies was also a major challenge in their care.

Posterior urethral valves were managed by continuous bladder drainage in the neonatal period. Any associated medical conditions were also managed. Definitive treatment was done for all of them at a later age.

Of the patients with meningomyelocele, 11 (73.3%) had surgical repair, two (18.2%) developed Arnold Chiari crisis post operatively and died, while four (26.7%) discharged against medical advice.

Overall there were 37 deaths giving a mortality rate of 28.0%. of these, 19 (51.3%) died post operatively. Twenty four (18.2%) discharged against medical advice mainly due to lack of funds. Sixteen (66.7%) of these patients were from the low income group.

Table 3 shows outcome of patients with or without surgical intervention.

Diagnoses	Surgical intervention		Outcome				
	Yes	No	Discharged	Died	Died	DAMA	Total
	Number (%)	Number (%)	Number (%)	Total (%)	Post op (%)	Number (%)	
<b>GI disorders</b>							
Intestinal obstruction (congenital atresias excluding anorectal)	16 (76.2)	5 (23.8)	8 (38.1)	9 (42.9)	7 (33.3)	4 (19.0)	21
NEC	5 (21.7)	18 (78.3)	13 (56.5)	6 (26.1)	3 (13.0)	4 (17.4)	23
Anorectal malformations	10 (76.9)	3 (23.1)	6 (46.2)	4 (30.8)	2 (15.4)	3 (23.1)	13
Omphalocele	0 (0)	12 (100)	6 (50.0)	3 (25.0)	0	3 (25.0)	12
Gastroschisis	0 (0)	3 (100)	0 (0)	2 (66.7)	0 (0)	1 (33.3)	3
Obstructed inguinal hernias	5 (100)	0 (0)	5 (100)	0 (0)	0 (0)	0 (0)	5
Cleft lip/palate	0 (0)	7 (100)	6 (85.7)	1 (14.3)	0	0	7
<b>Neural tube defects</b>							
Meningocele/ myelomeningocele	11 (73.3)	4 (26.7)	9 (60)	3 (20)	2 (13.3)	3 (20)	15
Hydrocephalus	5 (83.3)	1 (16.7)	3 (50.0)	2 (33.3)	2 (33.3)	1 (16.7)	6
Encephaloceles	2 (50.0)	2 (50.0)	1 (25.0)	1 (25.0)	1 (25.0)	2 (50.0)	4
<b>Genitourinary</b>							
PUV	0 (0)	4 (100)	3 (75.0)	0 (0)	0 (0)	1 (25.0)	4

Bladder extrophy	0 (0)	1 (100)	0 (0)	1 (100)	0 (0)	0 (0)	1
<b>Others</b>							
TOF	2 (40)	3 (60)	0 (0)	3 (60)	2 (40)	2 (40)	5
Septic arthritis	4 (36.4)	7 (63.6)	11 (100)	0 (0)	0 (0)	0 (0)	11
Multiple cong anomalies	0 (0)	2 (100)	0 (0)	2 (0)	0 (0)	0 (0)	2
<b>Total</b>	<b>60 (45.5)</b>	<b>72 (54.5)</b>	<b>71 (53.8)</b>	<b>37 (28.0)</b>	<b>19 (14.4)</b>	<b>24 (18.2)</b>	<b>132 (100)</b>

**Table 3:** Outcome of patients with or without surgical intervention

## Discussion

The prevalence of surgical diagnoses in our unit was 8.9%. Majority of the babies were born outside hospital. This is similar to findings by other authors both in Nigeria and other developing countries [4,8]. Being born outside the hospital implies poor antenatal care and lack of antenatal diagnoses. Many of these patients probably present to hospital only because they have highly specialized needs necessitating referrals to tertiary centers. This however results in delays in diagnosis and referral for surgical management and thus contributes to poor outcomes. This contrasts sharply with what obtains in the developed world where antenatal diagnoses is often available and treatment is planned even before birth [4,5].

The mean age at presentation of 5±6.39 days is on the high side. This is similar though lower than that recorded in the study by Gangopedhyay et al. [8] Delayed presentation may also be due to delayed recognition of the surgical nature of the illness and thus delayed referral from peripheral hospitals. Some of these patients were also brought in directly by their parents having recognized their inability to manage these problems at home. Delayed presentation and thus delayed intervention has been identified as a contributory factor to poor outcomes in neonates with surgical problems. [4,6,9]

The commonest diagnoses were disorders of the digestive system mainly intestinal obstruction, Necrotizing enterocolitis and anorectal malformations. This is similar to findings by other authors [8,9]. Bowel obstruction is one of the most common surgical emergencies in newborns. Successful management depends on timely diagnosis and appropriate intervention [10,11]. The overall outcome in our patients was not as good as outcomes in more developed centres [9]. Important contributors to death in patients who had abdominal surgeries were late presentations, severe infections and unavailability and exorbitant costs of Total Parenteral Nutrition (TPN). The unavailability of TPN has been highlighted in previous Nigerian studies [12,13] where like in this study babies were managed for prolonged periods with dextrose, multivitamin infusions and electrolytes with little success.

Of the abdominal wall defects seen in our patients, omphaloceles were more common than gastroschisis. This is similar to findings by other authors [14,15]. Mortality rate was however higher amongst those with gastroschisis. This is comparable to findings by Peyvasteh et al. [14] and different from Salihu et al. [15] The reason for this disparity is not readily explained. The lack of a covering membrane in gastroschisis and the high prevalence of infection among our patients contributed to the higher mortality among them. There was however no surgical intervention for any of these defects. The omphaloceles were managed conservatively with eventual closure of the defect and resultant anterior abdominal wall hernias which were repaired at a later date outside the neonatal period. These conservative measures

have been used by other authors with similar results [8]. Most of those that died had presented late and had severe infections.

The outcome for TEFs with or without oesophageal atresias has improved over the years with survival rates being more than 90% in the western world and increasing in many other areas [8,16,17]. The successes are in part due to improving peri-operative care. This is not the case in our centre. Although there is availability of trained personnel, the facilities for perioperative management of these patients are not available. This has led to early referral of these patients. However because of the cost implications, most patients cannot afford this option. Again the unavailability of TPN is a major challenge in the management of these patients. Two babies had feeding gastrostomies but developed complications at the stoma site and eventually died.

Meningocele/myelomeningocele were the commonest neurosurgical disorders with encephaloceles being relatively rare. This has also been noted by other authors [8]. Mortality rates among these babies were also higher than in other reports.[8] surgical intervention should ideally be within 24 hours. Infections at the site were prominent for many of these babies delaying closure in many cases and contributing to death in others.

The overall mortality rate was high both pre and post operatively. This has been reported by other authors in developing countries [4,12] and buttresses the fact that surgical problems in newborns are important contributors to morbidity and mortality. Some of the factors responsible for this high mortality rates are socio-cultural. Some of these babies had been taken to herbalists and other alternative sources of treatment before presentation to hospital. This contributed to delays in presentation and worsening of the clinical outcome. There were also parental misconceptions that newborns cannot withstand surgery or the causes of illness in their newborns were more 'spiritual' than medical. Such parental perceptions also contributed to delays in treatment and thus poor outcomes as it was sometimes difficult to obtain consent from parents for surgical intervention. This was also a contributor to DAMA.

The rate of DAMA was also very high with neonates who needed surgical intervention and specialized care being taken home or taken to seek alternative treatment. DAMA is not uncommon amongst children and newborns in the developing world as has been previously reported [8, 18-19]. The main reason given for these discharges was lack of funds to sustain treatment. This was not farfetched as majority of these patients were from the middle and low income groups. More importantly there were few like one of those with TOF, who desired to have their babies treated but left because of the unavailability of facilities for treatment in our centre and lack of funds to seek care in more developed centers. Although the National Health insurance

Scheme has been introduced, there are still challenges with implementation, thus, most patients still pay for services directly.

The outcome of newborns with surgical problems in our centre and indeed in many developing countries is likely to remain poor as long as these problems do not feature as contributors to neonatal morbidity and mortality. Drastic measures need to be taken to address the various problems highlighted.

## Conclusion

Congenital anomalies accounted for the majority of surgical diagnoses in the newborns. The commonest disorders were those of the digestive system. There was a high rate of DAMA and overall outcome for patients was poor. Contributory factors included late presentation, lack of facilities for peri-operative care, poverty and ignorance. Adequate attention needs to be paid to providing appropriate facilities and affordable care for newborns with surgical conditions. Appropriate research and international collaboration is necessary to improve neonatal surgical care in our region. There is also a need for public enlightenment on surgical problems in the newborn, antenatal diagnosis and improvement in health seeking behavior.

## References

1. Lawn JE1, Cousens S, Zupan J; Lancet Neonatal Survival Steering Team (2005) 4 million neonatal deaths: when? Where? Why? *Lancet* 365: 891-900.
2. Viguera Ester P, Torres A, Freire JM (2011) Factors associated to infant mortality in Sub-Saharan Africa. *Public Health Africa* 2: e27.
3. Bryce JI, Boschi-Pinto C, Shibuya K, Black RE; WHO Child Health Epidemiology Reference Group (2005) WHO estimates of the causes of death in children. *Lancet* 365: 1147-1152.
4. Ameh EA1, Ameh N (2003) Providing safe surgery for neonates in sub-Saharan Africa. *Trop Doct* 33: 145-147.
5. Bickler SW1, Sanno-Duanda B (2000) Epidemiology of paediatric surgical admissions to a government referral hospital in the Gambia. *Bull World Health Organ* 78: 1330-1336.
6. Nandi B1, Mungongo C, Lakhoo K (2008) A comparison of neonatal surgical admissions between two linked surgical departments in Africa and Europe. *Pediatr Surg Int* 24: 939-942.
7. Oyediji GA (1985) Socioeconomic and cultural background of hospitalized children in Ilesha. *Nig J Paed* 12: 111-117.
8. Gangopadhyay AN1, Upadhyaya VD, Sharma SP (2008) Neonatal surgery: a ten year audit from a university hospital. *Indian J Pediatr* 75: 1025-1030.
9. Ameh EA1, Dogo PM, Nmadu PT (2001) Emergency neonatal surgery in a developing country. *Pediatr Surg Int* 17: 448-451.
10. de la Hunt MN (2006) The acute abdomen in the newborn. *Semin Fetal Neonatal Med* 11: 191-197.
11. de Silva NT1, Young JA, Wales PW (2006) Understanding neonatal bowel obstruction: building knowledge to advance practice. *Neonatal Netw* 25: 303-318.
12. Osifo OD, Ovueni ME (2009) The prevalence pattern and causes of death of surgical neonates at two African referral Pediatric Surgical centers. *Annals of Pediatric Surgery* 5: 194-199.
13. OsifoOd, OkoloJC (2008) Management of intestinal atresia : the challenges, and outcomes in a resource – scarce region. *SurgPract* 13: 35-40.
14. Peyvasteh M, Askarpour S, Javaherizadeh H, Fatahian T (2011) Evaluation of epidemiologic indices of neonates diseases in the Pediatric Surgery ward of the Ahvaz Jundishapur University hospitals during the period 1993-1996 and 2002-2005. *Annals of Pediatric Surgery* 7: 7-9
15. Salihu HM1, Boos R, Schmidt W (2002) Omphalocele and gastrochisis. *J Obstet Gynaecol* 22: 489-492.
16. Sharma AK1, Shekhawat NS, Agrawal LD, Chaturvedi V, Kothari SK, et al. (2000) Esophageal atresia and tracheoesophageal fistula: a review of 25 years' experience. *Pediatr Surg Int* 16: 478-482.
17. Bhatnagar V, Agarwala S, Bajpai M, Gupta DK, Mitra DK (1997) Results of treatment of esophageal atresia. *IAPS*; 2: 55.
18. Opara PI, Eke GK (2010) Discharge against medical advice amongst neonates admitted in a special care baby unit in Port Harcourt, Nigeria. *Int J PediatrNeonatal* 12:2.
19. Onyiriuka AN (2011) Pediatric discharge against medical advice: experience from a Nigerian secondary health care institution. *Medical journal of Islamic Republic of Iran* 25 (4); 194-199.