

## Pattern of Neonatal Surgery at a Teaching Hospital in Nigeria: A Review of 101 Cases.

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**Background:** Neonatal surgeries are a particularly challenging aspect of paediatric surgery following the peculiar physiologic and metabolic demands of neonates. Surgery in the neonates therefore will require specific anaesthesia, analgesia, intraoperative and postoperative monitoring. There are a wide range of surgical conditions requiring surgery in the neonates.

**Methods:** The study was a retrospective study of neonates who underwent various surgeries from 2010-2012. The study was carried out at the University of Benin Teaching Hospital, Benin City, Nigeria. A total of 101 neonates had various surgeries during this period.

**Results:** A total of 53 males and 48 females were seen with a male to female ratio of 1.1:1. The ages at presentation of the neonates ranged between few hours to 28 days. A wide range of clinical conditions involving various systems of the body were seen requiring surgery. These varied from neurosurgical plastic to gastrointestinal conditions. Most of the cases were congenital anomalies involving the gastrointestinal system (87.1%). Adequate analgesia was achieved with use of intravenous paracetamol in our patients. This does not require monitoring unlike in the case of opioids. Active postoperative monitoring is crucial to achieving good outcome in neonatal surgery.

**Key words:** Neonatal, Congenital, Surgery

### Introduction

The surgical neonate poses significant test to the expertise of the pediatric surgeon. This is because the neonate has a peculiar demand in terms of their physiology and metabolic requirements that can be deranged in the presence of a surgical need. A thorough understanding of neonatal physiology and metabolism is needed to achieve success in neonatal surgery. Specific considerations include anesthesia, analgesia temperature control, intra-operative and post-operative monitoring. The management of neonatal surgical problems continues to pose considerable challenges especially in low resource settings<sup>1</sup>.

Surgery in neonates is commonly an open procedure mainly due to the small size of their body frame. However increasing success is being recorded in the field of laparoscopic neonatal surgery<sup>2</sup>. Surgery for neonates is mostly for congenital anomalies for which they present early in life.

### Patients and Methods

The study was a retrospective study of neonates who underwent various surgeries from 2010-2012. The study was carried out at the University of Benin Teaching Hospital, Benin City, Nigeria. The hospital is one of the major teaching hospitals in Nigeria. The neonates were on admission at the Special Care Baby Unit (SCBU) of the hospital. The SCBU has a capacity for about 50 neonates and it is equipped with neonatal incubators, phototherapy machines, resuscitators and other equipments for the proper care of neonates.

Patients are admitted into the SCBU from the obstetrics and gynaecology department of the hospital and from referrals from every part of the state (Edo state). The SCBU of the hospital also frequently receive patients from adjoining states like Delta, Kogi and Ondo states. Neonatal surgeries are mainly handled by the paediatric surgeons and occasionally by the paediatric neurosurgeons and plastic surgeons.

Neonates who had surgeries for various conditions were analyzed over the 3 year period. Data was obtained from the admission register in the unit and from case notes of the patients. The case notes were retrieved from the medical records department of the hospital. Relevant data retrieved included the names, sex, age at presentation, diagnosis and type of surgery.

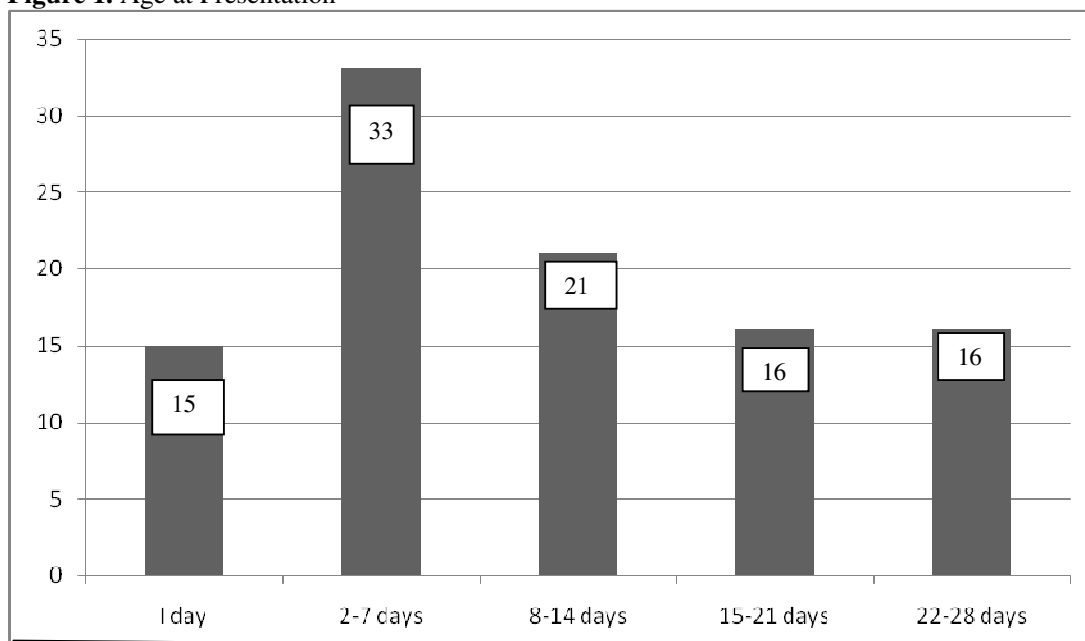
The data was analyzed using simple statistical methods and also application of SPSS version 10.

## Results

A total of 101 neonatal surgeries were done over the 3 year period (2010-2012). The surgeries mainly performed by the paediatric surgeons, paediatric neurosurgeons and plastic surgeons. A total of 53 males and 48 females were seen with a male to female ratio of 1.1:1. The age at presentation of the neonates were between few hours to 28 days. The distribution of the age at presentation and corresponding number of patients is shown in Figure 1. A wide range of clinical conditions involving various systems of the body were seen requiring surgery. These range from neurosurgical plastic to gastrointestinal conditions. Table 1 show the distribution of cases. Table 2 show the distribution of cases.

Gastrointestinal cases form a very large percentage (87.1%) of surgeries done in neonates. These gastrointestinal conditions cut across a wide range of congenital anomalies. Distributions of the gastrointestinal cases are shown in Table 2.

**Figure 1.** Age at Presentation



**Table 1.** Distribution of Cases by System

System	Number	Percentage
Neurosurgery	2	1.9
Plastic	2	1.9
Gastrointestinal	88	87.1
Genitourinary	4	3.9
Thoracic	2	1.9
Tumours/Oncology	3	2.9

**Table 2.** Distribution of GIT Cases

Diagnosis	Number of Cases	Percentage
Anorectal Malformation	18	20.4
Omphalocele	5	5.6
Gastroschisis	12	13.6
Hirschsprung's disease	8	9.1
Intestinal Atresia/Stenosis	20	22.7
Hernia	6	6.8
Gastric Outlet Obstruction	7	7.9
Necrotizing Enterocolitis	4	4.5
Malrotation	8	9.1
Total	88	100

**Table 3.** Colostomy Rate

Diagnosis	Number of cases	Percentage
Anorectal malformation	12	66.6
Hirschsprung's disease	5	62.5
Necrotizing enterocolitis	1	25.0

Exteriorization of a portion of the bowel (small intestine and colon) and creation of a stoma is an acceptable temporary way of managing some neonatal conditions like anorectal malformation, Hirschsprung's disease and necrotizing enterocolitis. In this study 18 patients had one form of colostomy or the other as shown in Table 3.

## Discussion

A total of 101 neonatal surgeries were recorded between 2010 and 2012 at the SCBU in our centre. The male to female ratio was almost equal with ratio of 1.1:1. Most of the conditions seen were congenital anomalies of the different systems of the body. Few neonates were observed to have multi-systemic involvements. In these categories only the system for which surgery was done in the neonatal period was recorded in this study. Congenital anomalies are the commonest cause of surgical intervention in neonates as clearly shown in this study. The age at presentation range from the day of delivery to 28 days of life. This distribution is shown in Table 1.

A total of 14.8% of the neonates presented on the day of delivery. It was observed that a majority of these patients presented with anterior abdominal wall defects (gastroschisis and omphalocele). These are very obvious deformities for which the newborns are not usually taken home after delivery. About a third (32.6%) presented between 2<sup>nd</sup> day and 7<sup>th</sup> day of life, while 20.7% presented between 8<sup>th</sup> and 14<sup>th</sup> day of life. Many of these patients had intestinal obstruction from varying causes. very but quickly referred to the paediatric surgeons.

They presented with episodes of vomiting and abdominal distention which had progressively worsened. It was observed that a majority (32.6%) of all our patients presented between 2<sup>nd</sup> and 7<sup>th</sup> day of life. There was a wide spectrum of disease conditions recorded in the period of the study. Gastrointestinal cases had the highest contribution with 87.1%

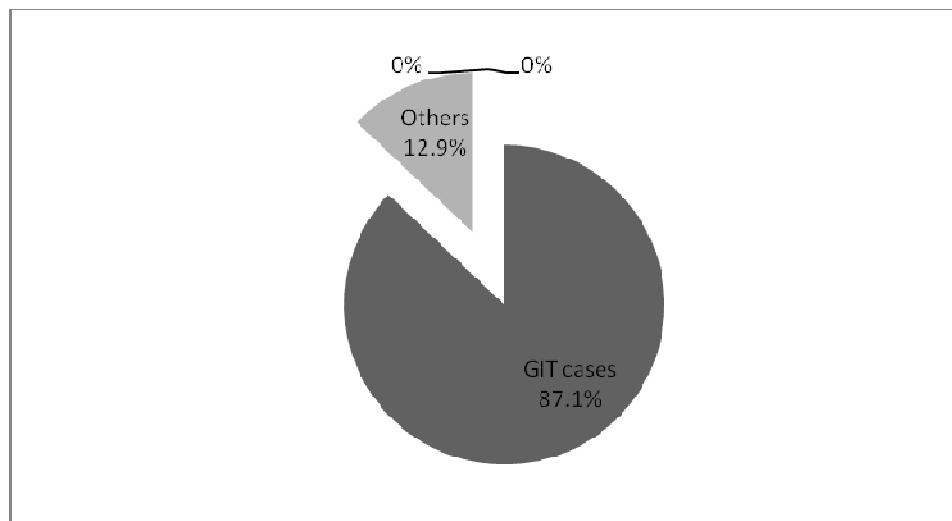
**Neurosurgery:** 2 (1.9%) cases were seen over the period that was admitted into the SCBU. Both cases were that of frontal encephalocele that was repaired.

**Plastic surgery:** 2(1.9%) cases of burn injury that required surgery were seen .The patients presented at the 22<sup>nd</sup> and 26<sup>th</sup> day of life.

**Genitourinary surgery:** 4 (3.9%) neonates with genitourinary conditions were seen during the period. The male to female ratio was 1:1. The 2 female neonates seen presented with progressive lower abdominal distention from hydrometrocolpos and imperforate hymen as well vaginal atresia. One of the male neonates presented with posterior urethral valves while the other had bilateral pelvi-ureteric junction obstruction.

**Thoracic surgery:** 2 (1.9%) of thoracic cases were seen and both were oesophageal atresia and tracheoesophageal fistula. Both had right posterolateral thoracotomy with primary anastomosis.

**Tumour surgery:** Two cases of sacroccocygeal teratoma Type I were seen over the period and one case of cervical cystic hygroma with obstructive symptoms. All the three cases had excision of the masses during the neonatal period.



**Gastrointestinal surgery:** This accounted for the highest contribution with 87.1%. Intestinal atresia/stenosis accounted for the largest cause of neonatal surgeries from the gastrointestinal system with 22.7%. This was followed by anorectal malformations (ARM) with 20.4%. Others are gastroschisis 13.6%, Hirschsprung's disease 9.1% and gastric outlet obstruction 7.9%. Infantile hypertrophic pyloric stenosis (IHPS) was responsible for all the cases of gastric outlet obstruction. It has been observed in the hospital that there has been a progressive decline in the incidence of IHPS since the introduction of baby friendly practice in the hospital.

The other contributions were from malrotation (9.1%), omphalocele (5.6%), obstructed hernias (6.8%) and necrotizing enterocolitis (4.5%). Of the 5 patients with omphalocele, 3 were ruptured and 2 had primary skin cover following omphalocele minor. Six neonates presented with symptomatic inguinoscrotal hernia requiring emergency groin exploration. Most of the neonates had primary repair for their anomalies.

Colostomy was done for 18 of the neonates with anomalies like anorectal malformation (ARM), Hirschsprung's disease (HD) and necrotizing enterocolitis (NEC). These included 12 patients with ARM, 5 patients with HD and 1 with NEC. Creation of colostomy is a palliative and acceptable way of initial treatment of these conditions to allow the neonate to grow. The colostomy rate for ARM was 66.6%, HD 62.5% and NEC 25%. Creation of colostomy is a temporary and acceptable way of initial treatment of these conditions to allow time for the neonates to grow.

Safe and effective analgesia for neonates undergoing major surgery remains a challenge particularly in institutions where resources are limited. Effective pain relief for neonates is considered essential as it is only humane but may play a role in surgical outcome<sup>3, 4</sup>. In this review adequate postoperative analgesia was achieved by paracetamol administration at 10mg/kg/dose 6 hourly. This was observed to have good control of pain.

The use of intraoperative and postoperative opioids has been shown to have respiratory depressive effects on the neonates causing apnoeic attacks. Intraoperative opioids and subsequent continuous postoperative infusions are widely used but usually mandate ventilatory support and/or close monitoring and supervision following major surgery<sup>3, 5, 6</sup>. Postoperative opioids are not usually given in our center to neonates to avoid untoward side effects in the absence adequate monitoring.

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