

## Neonatal Surgery: A Four-year Experience in a Teaching Hospital of Birgunj

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### ABSTRACT

#### Introduction

Neonatal surgery is one of the most challenging issues in medical field. The outcome of neonatal surgery is still poor in developing countries. The aim of this study was to report our experience regarding the etiological spectrum of neonatal surgical conditions and their outcome after surgical management.

#### Methods

A descriptive retrospective study which included all the neonatal cases that presented to Pediatric Surgery Department of National Medical College, Birgunj in the last four years. All the neonates that underwent surgery from April 2017 to March 2021 were included in the study.

#### Results

A total of 68 neonates were operated during the analyzed time period. Male to female ratio was 2.2:1. The age at presentation varied from 2 to 28 days and birth weight from 1.2 to 3.4 kg. Anorectal malformation (32.3%) was the commonest cause of surgery followed by tracheo-esophageal fistula (14.7%) and pyloric stenosis (8.8%). Mortality rate was 20.5% with septicemia as the commonest post operative complication.

#### Conclusion

The outcome of neonatal surgery in our center is not up to mark as compared with centers in developed countries. Early presentation of the patients, well equipped surgical neonatal intensive care facilities and trained manpower are needed to improve the outcome.

#### Keywords

*Complication, neonate, pediatric surgery, surgical management*

## INTRODUCTION

Neonatal surgery in a developing country is a challenging issue. Performing a surgery on a neonate is a challenge to the pediatric surgical team and the supporting staff.<sup>1,2</sup> Neonatal surgeries are mostly performed for congenital malformations.<sup>3</sup> An in-depth knowledge of neonatal anatomy, physiology coupled with advanced surgical skills and pre and post operative neonatal care is required for neonatal surgery.<sup>4</sup> The advances in neonatal intensive care have improved outcomes in developed countries whereas in developing countries like ours, the outcome is far from what should be the standard.<sup>5</sup>

The incidence of surgical emergency in neonates range from 1-4 per 1000 births.<sup>6</sup> Neonates present with various surgical conditions like anorectal malformations, intestinal atresia, tracheo-esophageal fistula, hirschsprung disease, necrotizing enterocolitis, anterior abdominal wall defects, congenital diaphragmatic hernia, obstructed inguinal hernia etc.

The aim of this study was to analyze the presentation of different neonatal cases and its outcome during the last four years in a teaching hospital outside Kathmandu.

## METHODS

This was a descriptive retrospective study which included all the neonatal cases that presented to Pediatric Surgery Department of National Medical College (NMC), Birgunj during the last four years. The data included in this study was from April 2017 to March 2021. Ethical clearance was obtained from the institutional Review Committee of NMC (Reference No: F-NMC/563/078-079). All the neonates that underwent surgery were included in the study. A total of 68 cases were included in our study.

All the data were collected from the records available in the record section of the hospital. We evaluated the distribution of presentation, complications of the surgery, and mortality among the cases of different surgical neonatal diseases. The outcome included in the study were complications faced post-surgery and rate of mortality.

The data were collected in data collection sheet and was entered in Microsoft Excel 2016. Data analysis was done using the Statistical Package for the Social Sciences (SPSS) version 16.

## RESULTS

A total of 2160 neonates were admitted in Neonatal Intensive Care Unit (NICU) during the data collection period. The total number of neonates who underwent surgery was 68 (incidence rate

Table 1. Days of presentation

Age in days	Number (%)
<2	11 (16.2)
2-5	32 (47)
6-10	6 (8.8)
11-15	5 (7.4)
16-20	5 (7.4)
21-28	9 (13.2)

of 3.1%), out of which 47 were male and 21 were female. Age was variable from 1 to 28 days (mean =  $8.04 \pm 8.46$  days) and birth weight from 1.2 Kg to 3.4 kg (mean =  $2.28 \pm 0.53$  Kg).

Anorectal malformation (ARM) was the most common etiology for neonatal surgery followed by tracheoesophageal fistula, pyloric stenosis and Hirschsprung disease (HD). (Table 2)

Out of 22 patients of anorectal malformation, 15 had a high variety type while 7 had a low variety. 14 patients of ARM had at least one associated anomaly while 8 others were cases of isolated ARM only.

Out of 68 patients, 54 survived with a survival rate of 79.5%. Among 14 deaths, highest mortality was seen in cases of tracheoesophageal fistula (40%) (Table 3). The most common post-operative complications were septicemia, wound dehiscence and anastomotic leakage.

## DISCUSSION

A total of 2160 neonates were admitted in NICU during the study period, out of which 68 patients

Table 2. Etiological spectrum of neonatal surgical disease

Disease	Number (%)
Anorectal malformation	22 (32.5)
Tracheo-esophageal fistula	10 (14.7)
Pyloric stenosis	6 (8.8)
Hirschsprung disease	5 (7.3)
Necrotizing fasciitis	4 (5.9)
Jejunioileal atresia	3 (4.4)
Duodenal atresia	3 (4.4)
Necrotizing enterocolitis	3 (4.4)
Congenital diaphragmatic hernia	2 (2.9)
Gastrochisis	2 (2.9)
Omphalocele	2 (2.9)
Malrotation	2 (2.9)
Meconium Ileus	1 (1.5)
OEIS Complex	1 (1.5)
Obstructed inguinal hernia	1 (1.5)
Empyema thoracis	1 (1.5)

Table 3. Mortality

Disease	Number (%)
Tracheo-esophageal fistula	4 (5.8%)
Anorectal malformation	2 (2.9%)
Necrotizing fasciitis	2 (2.9%)
Jejunioileal atresia	1 (1.5%)
Duodenal Atresia	1 (1.5%)
Congenital diaphragmatic hernia	1 (1.5%)
Gastrochisis	1 (1.5%)
Omphalocele	1 (1.5%)
OEIS Complex	1 (1.5%)
Total	14 (20.6%)

Table 4. Post-operative complications (Clavien Dindo classification)

Grade	Number
1	12
2	7
3a	4
3b	8
4a	3
4b	17
5	14

Table 5. Outcome of surgery

Outcome	Number (%)
Cured	17 (25)
Complication	37 (54.4)
Mortality	14 (20.6)

underwent surgery. The neonatal surgery incidence rate of 3.1% in our study is low as compared to other studies. Chokwobuikwe reported a incidence rate of 9.5%<sup>7</sup> whereas other studies have reported incidence rate of 12.7%,<sup>2</sup> 6.2%.<sup>8</sup> The fact is that the incidence of neonatal surgery varies depending upon the type of centers. Dedicated neonatal surgical centers are obviously going to perform more surgeries. The incidence rate in our study is low because of the reason that neonatal surgical services started as recently as five years back and this center is not a pediatric surgical referral centre.

There is a male predominance in our study (Male: 69.1%, Female: 30.9%). A study done at Kanti Children's Hospital, Kathmandu, Nepal showed a similar pattern. The study revealed that 76.8% of total patients were male and 23.2% were female.<sup>9</sup> Meanwhile other studies have revealed a lower percentage of males as compared to ours but even then the male predominance is evident in those studies.<sup>10,11</sup>

Anorectal malformation was the most common indication for surgery in our study. Similarly, Basnet et.al<sup>9</sup> showed that anorectal malformation (30.72%) was the most common problem for which neonatal surgery was done. This finding is consistent with several other studies.<sup>10,12-15</sup> There is a male predominance in anorectal malformation in this study (M=18,F=4) which is in line with a study conducted in USA.<sup>16</sup> Most of our patients with anorectal malformations presented after 3 days of life. Other common causes of neonatal surgery in our study were TEF, pyloric stenosis, and Hirschsprung disease.

The neonatal mortality rate of Nepal in 2020 was 16.8%.<sup>17</sup> The contribution of neonatal surgery in this mortality is exactly unknown but it must be pretty significant. Despite this, the concerned authorities have failed to give enough attention to the field of neonatal surgery. There is a single government children hospital in our country which is the only referral center for pediatric surgical patients.

The mortality rate in our study was similar with studies that were conducted in the developing countries.<sup>14,18,19</sup> When compared to developed countries these rates are very high. The neonatal surgical mortality in developed countries is reported to be less than 5%.<sup>20-23</sup> The most common cause of mortality in our study was septicemia. The high mortality is probably due to late presentation of the patients, lack of proper peri-operative care in the NICU, and paucity of trained support staff. The outcomes in surgical neonates depend not only on the skills of operating surgeon but also on the team that deals in caring for the surgical neonates. This team consists of pediatrician, anesthetist, radiologist, nurses, and the support staff. The mortality can be reduced by timely referral and safe transport of the neonates to centers where neonatal surgical facilities are available. Collaboration with neonatologists and availability of pediatric anesthetists would further help in reducing the mortality rate.

## CONCLUSION

Anorectal malformation was the most common indication of neonatal surgery. There is a significant difference in outcomes of neonatal surgery between the developing countries and the developed ones. Countries like ours face different challenges that include lack of proper neonatal intensive facilities, late presentations of patients and lack of trained manpower.

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## CONFLICT OF INTEREST

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