

Pattern and Outcome of Neonatal Surgery: Experience at King Fahad Hospital Al-Baha

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ABSTRACT

Aims: To share our experience of neonatal surgery regarding varieties of cases, management, outcome and to look into and compare the factors causing differences in morbidity and mortality.

Duration: 3 years (Jan 2011 to Dec 2013).

Study Design: Retrospective analysis.

Setting: Depart. of pediatric surgery & neonatal intensive care unit King Fahad Hospital Al Baha KSA.

Methods: A retrospective study was conducted from Jan 2011 to Dec 2013. During 3 years period 57 neonates were operated. Data was retrieved from operation theatre register, neonatal surgery register from neonatal intensive care unit and from medical record office. Neonates undergoing major surgical procedures were included in the study and minor surgical cases like inguinal hernia and circumcision were excluded from the study.

Results: In our study males were predominant and majority of cases 35(64.40%) were less than 7 days of age at time of operation. Congenital diaphragmatic hernia was the most common pathology 11(19.92%), followed by NEC 10(17.54%), Hirschsprung's disease 7(12.28%), intestinal atresia 6(10.52%), anorectal malformation 5(8.77%) and Tracheoesophageal fistula 3(5.26%) etc. Out of 57 patients, 7 patients expired after surgery, our mortality was 12.28%. Two patients developed sepsis and there was one recurrence after diaphragmatic hernia. Our morbidity and mortality was minimum and there was no major bleeding, anastomotic leak and iatrogenic injury in our series.

Conclusion: We conclude that variety and pattern of surgical neonates undergoing neonatal surgery in our study is similar to other developing countries but there is difference in morbidity and mortality between developed and developing countries. Developing countries should implement cost effective improvement factors like improvement in antenatal care to reduce prematurity and strict implementation of hand scrubbing and hand washing to reduce post operative morbidity and mortality.

Key words: Neonate, Surgery, Outcome, Improvement factors.

INTRODUCTION

Neonatal surgery is one of the most important and critical era of pediatric surgery. It needs high level of preoperative, operative and post operative management to get excellent results. There are so many factors which can predict and affect the outcome of neonates after surgery. So, this study was planned to assess data and factors which are causing significant decrease of morbidity and mortality in our centre as compared to other developing countries. So that, other developing countries can improve their morbidity and mortality by following these parameters. Recently, there is decrease in maternal and child mortality among United Nations member country like Portugal and Brazil^{1,2}. Very few studies can be found in literature addressing specifically the surgical infant and neonatal population^{3,4,5,6}. This is the first study from our hospital about pattern and outcome of neonatal surgery.

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MATERIAL AND METHOD

The study was conducted in department of pediatric surgery and neonatal intensive care unit at King Fahad Hospital Al-Baha KSA. Retrospective analysis of medical records of neonates undergoing major surgical procedures from Jan 2011 to Dec 2013 was done. Data was retrieved from operation register, neonatal surgery register and medical record room. Unoperated cases and minor operated surgical cases like inguinal hernia and circumcision were excluded from the study. Also, cases belonging to pediatric urology, pediatric neurosurgery and plastic surgery were not included.

RESULTS

Males were predominant (Table 1). Thirty five (61.40%) patients were up to 7 days age, 12(21.05%) were more than 7 to 15 days and only 10(17.54%) were more than 15 days (Table 2). Thirty two (56.14%) neonates were between 2-3 Kg at time of operations (Table 3). Majority (59.64%) of the neonates were >37 weeks gestational age (Table 4).

In our study out of 57 operated cases 11(19.29%) were congenital diaphragmatic hernia, 10(17.54%) were NEC, 7(12.28%) were Hirschsprung's disease ,6(10.52%) were intestinal atresia, 5(8.77%) were anorectal malformations, 4(7.01%) were gastric perforation, 4(7.01%) were pyloric stenosis, 4(7.01%) were gastroschisis and omphalocele 3(5.26%) were esophageal atresia with tracheoesophageal fistula, ,3(5.26%), meconium ileus 1, pyloric atresia 1 and ovarian cyst 1 each (Table 5). The different operative procedures done in our study are shown in (Table 6). Radiological, operative and follow up pictures of some patients in our series also have been shown along with their comments. Thirty five(61.40%) patients operated within 2 days after admission,12(21.05%) were operated between 3-5 days after admission and only 10(17.54%) patients were operated more than 5 days after admission(Table7). The post operative complications in our series were septicemia (n=2), recurrence of CDH (n=1), adhesive intestinal obstruction (n=1) and redo surgery (n=1) shown in (Table 8). There was no major bleeding, anastomotic leak and iatrogenic injury in our study. Ten out of 11 operated cases of CDH survived and also all three operated cases of TOF survived. Out of 57 operated cases 7(12.28%) patients expired. Contribution to mortality was mainly by NEC (5.25%) followed by H.D.(1.75%), CDH (1.75%), pyloric atresia (1.75%) and gastroschisis (1.75%)as shown in(Table9).

Table 1: Sex distribution

Gender	n	%age
Males	33	57.89
Females	24	42.10
Total	57	100

Table 2: Age distribution

Age	n	%age
Up to 7 days	35	61.40
8-15 days	12	21.05
>15	10	17.54
Total	57	100

Table 3: body weight of the neonates

Weight	n	%age
<1 Kg	5	8.77
1-2 Kg	10	17.54
>2-3 Kg	32	56.14
>3Kg	10	17.54
Total	57	100

Table 4: gestational age of the neonates

Gestational age	n	%age
<28 weeks	6	10.52
28-37 weeks	17	29.82
>37 weeks	34	59.64
Total	57	100

Table 5: Type of diseases

Diagnosis	n	%age
CDH	11	19.29
NEC	10	17.54
H.D.	7	12.28
Intestinal atresia	6	10.52
Anorectal malformation	5	8.77
Gastric perforation	4	7.01
Pyloric stenosis	4	7.01
Gastroschisis, omphalocele	4	7.01
Tracheoesophageal fistula with esophageal atresia	3	5.26
Meconium ileus	1	1.75
Pyloric atresia	1	1.75
Ovarian cyst	1	1.75

Table 6: Operative procedures

Procedure	n	%age
Resection anastomosis	13	22.80
CDH repair	11	19.29
Laparotomy+ stoma	8	14.03
Colostomy	6	10.52
Gastric perforation repair	4	7.01
Pyloromyotomy	4	7.01
TOF repair	3	5.26
Anoplasty	2	3.50
Duodenoduodenostomy	1	1.75
Pyloroduodenostomy	1	1.75
Gastroschisis repair	2	3.50
Omphalocele repair	2	1.75

Table 7: Duration between admission and operation (n=57)

Duration between admission and operation	n	%age
0-2 days	35	61.40
3-5 days	12	21.05
>5 days	10	17.54

Table 8: Complications

Complications	n	%age
Septicemia	2	3.5
Recurrence of diaphragmatic hernia	1	1.75
Adhesive intestinal obstruction	1	1.75
Redo surgery	1	1.75
Bleeding	0	0
Iatrogenic injury	0	0
Anastomotic leak	0	0

Table 9: Mortality:

Disease	n	%age	Cause of death
NEC	3	5.26	Sepsis/gangrenous gut
H.D.	1	1.75	Septicemia(pneumoperitoneum)
CDH	1	1.75	ventilator acquired pneumonia
Pyloric stenosis	1	1.75	Due to fungal infection.
Gastroschisis	1	1.75	due to seratia
Total	7	12.28	

Omphalocele



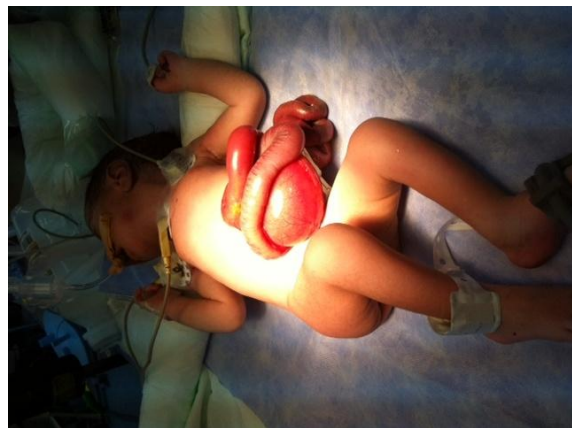
X ray chest showing left diaphragmatic hernia



Follow up picture of omphalocele repair



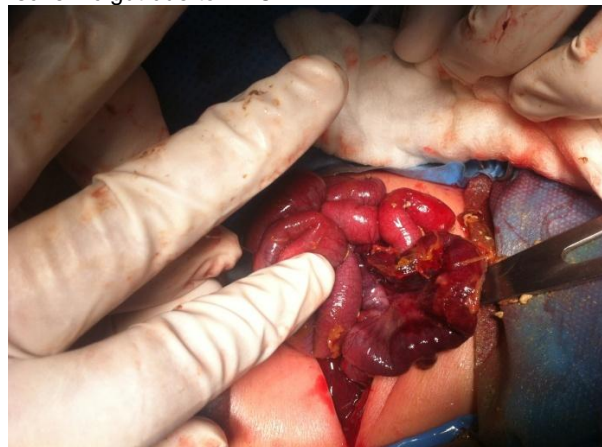
Gastroschisis



Ultrasonic picture of pyloric stenosis showing pylorus wall thickness more than 5 mm



Ischemic gut due to NEC



X-ray abdomen showing gastric outlet Obstruction peroperative was case of pyloric atresia



Follow up picture of TOF repair



Case of jejunal atresia with huge dilated proximal jejunum



Cone with contracted and dilated segment at upper sigmoid level Suggestive of Hirschprung disease in 3 days old neonatal



Fistula ligation in tracheoesophageal fistula

DISCUSSION

Although worldwide majority of cases of neonatal death are birth asphyxia, prematurity and severe infection, but a little attention has been given surgically operated condition in neonates for their contribution to neonatal mortality⁷. Knowledge of pattern and outcome of local or regional health problem is very important to improve that problem.

In our retrospective analysis of medical records of neonates undergoing major surgical procedure, we have emphasized on pattern and outcome of neonatal surgery at our centre. Our hospital is the biggest hospital at Al Baha, receiving patients from all other peripheral hospital in Al Baha region. Our hospital is JCIA accredited and has excellent quality department. Our study is the 1st one from our hospital

about pattern and outcome of neonatal surgery. We admitted 75 surgical neonates out of which 57 surgical neonates were operated during 3 years period. That is about 19 cases per year.

In another study 39 cases were operated per year⁸. This number was much more in India where 122 cases were operated in 1 year⁹. We have relatively decrease burden of neonatal surgical patient due to decrease population of Al Baha region, which is the smallest state of Saudi Arabia and also we excluded pediatric surgical subspecialty cases of surgical neonate from our series.

In our series males were predominant similar to series by Catre D et al⁸. We encountered 35 (64.40%) cases within 7 days of life (Table 2). Thirty two (56.14%) were between 2 to 3 kg (Table 3). Majority (59.64%) neonates were more than 37 weeks gestational age (Table 4). In our study CDH was most common surgical disease 11(17.5%) followed by NEC 10(17.54%) and Hirschprung's disease 7(12.28%) (Table 5). Catre D et al has also described CDH as most common surgical condition in his series⁸. Al-Turkistani HK has published series of 29 case of CDH in 10 years period about 3 cases per year⁹. In Manchanda et al series, esophageal atresia followed by anorectal malformation was most common surgical disease¹⁰. In a study from Security Forces Hospital, Riyadh, Saudi Arabia, 29 cases of NEC were operated in 6 years period, about 5 cases per year¹¹. The common post operative complications in our series were septicemia 2(3.5%), recurrence of diaphragmatic hernia 1(1.75%) and adhesive intestinal obstruction 1(1.75%) etc (Table 8). There was no major bleeding (operative and post-operative), iatrogenic injury and anastomotic leak in our study. We did single layer extramucosal interrupted anastomosis in majority of cases. Catre D et al has described neonatal sepsis in 2 cases post operatively as cause of death which is similar to our series. Seven out of 57 operated cases expired after surgery in our series (Table 9). So, mortality in our series was (12.28%). Manchanda V et al from India has mentioned post operative mortality of 35.15% in 15 months study which is much higher than our series¹⁰. In another study from Portugal post operative mortality was 6.4% which is less than us because Portugal is one of the developed countries⁸. Global neonatal mortality is variable depending upon level of development of that country. Two large studies reported 6.7%³, 7.5%¹² in South Korea and Japan respectively as compared to 35% and 45 % mortality in studies from India¹³ and Nigeria¹⁴ respectively. NEC was the most common cause for mortality 3(5.26%) in our series. One case of NEC developed sepsis after surgery and 2 cases have gangrenous gut (pan colitis). NEC is known to be life

threatening condition related to immaturity and low birth weight^{15, 16}. All cases of NEC which expired in our series have very low birth weight. Also, out of 7 expired cases 6 were premature. We observed prematurity as significant risk factor for mortality in our series. Post operative morbidity and mortality is high for NEC leading to abdominal sepsis and multi organ failure^{17, 18}. Catre D et al found NEC as leading cause of hospital mortality following neonatal surgery similar to our series⁸.

We observed some improvement factors in our series responsible from decrease morbidity and mortality like dedicated and experienced medical and surgical teams, including pediatric surgeon, neonatologist, pediatric anesthetist, well equipped hospital, isolation room, high frequency ventilation, strict implementation of hand scrubbing and hand washing, use of blanket warmer during operations, preoperative and postoperative management under neonatologists in neonatal intensive care unit. Thus, optimal stabilization procedures and access to special care will improve outcome of neonates undergoing neonatal surgery in general.

CONCLUSION

We conclude that variety and pattern of surgical neonates undergoing neonatal surgery in our study is similar to other developing countries but there is difference in morbidity and mortality between developed and developing countries. Our morbidity and mortality in neonatal surgery is low as compared to other developing countries like India, Pakistan, and Nigeria etc. Developing countries should implement cost effective improvement factors like improvement in antenatal care to reduce prematurity, strict implementation of hand scrubbing and hand washing preoperative and postoperative management in neonatal intensive care unit under experienced neonatologist and operative management by experienced pediatric surgeon and pediatric anesthetist without delay to reduce post operative morbidity and mortality. There is also need to arrange workshops and symposiums on preoperative and post operative management of surgical neonates, instead of doing symposiums only on operative procedures.

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