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Original Article

Challenges of Management and Outcome of Neonatal Medical Emergencies in a Peripheral Hospital, Bangladesh

Ferdous J[1] , Rashid HO[2], Islam MT[3], Ferdous K[4]

Abstract

Background: Respiratory distress and desaturation remains a significant cause of neonatal intensive care admission ,although management has evolved gradually over the years resulting in improving survival for the these neonates . Still 10% of neonates require respiratory support immediately after delivery due to respiratory disorder, and up to 1% of neonates are in need of resuscitation.

Objectives: The aim of the study is to present some fundamental steps of emergency neonatal management which include rapid identification and admission , followed by assessment for respiratory distress, hypoxemia and hypoglycemia ,initial stabilization when required and early administration of medications .

Methods: This hospital based retrospective study was conducted at Combined Military Hospital ,sylhet ,Bangladesh from April 2021 to September 2022 .A total 224 sick neonates shortly after delivery included for this study .

Results: From April ,2021 to september 2022 , 917 newborn were born, of which 224 neonates were identified and admitted as a emergency cases immediate after delivery at combined military hospital,sylhet .Immediately after admission around all cases were assessed for hypoxemia ,hypoglycaemia and hypothermia.Around 66% were hypoxemic (preterm 71.4% ,22.3% in full term and 6.2% in post term).There was male predominance 55% .Respiratory distress syndrome (RDS) was found to be the commonest 35.7% causes followed by persistent pulmonary hypertension with large patent ductus arteriosus(PPHN with PDA) 17.8% ,septicemia 16.9% ,meconium aspiration syndrome (MAS) 8.9%, transient tachypnea of newborn (TTN) 8%, congenital pneumonia 4.9% ,perinatal asphyxia (PNA) 3.5% , large atrial septal defect (ASD) with ventricular setal defect (VSD) 2.6% and 1.75% was hypoglycemic .All babies received immediately oxygenation . Bubble CPAP was required in 90 (40.1%) cases. Vascular access was established in all cases and 2.6% neonates received medications bycentral (femoral) line. Mortality was 2(0.8%) in neonates with respiratory distress due to respiratory distress syndrome with multiple congenital anomalies . 2(0.8%) cases referred to tertiary hospital (Combined Military Hospital,Dhaka) requiring mechanical ventilation.

Conclusion: Early and appropriate treatment seeking is one of the most important aspects for interrupting the pathways to neonatal deaths due to severe illness. In developing countries, the role of Paediatrician is multidimensional . paediatrician by early detection of risk factors and timely intervention can reduce significantly neonatal mortality rate .

Keywords: bCPAP, Combined military hospital (CMH), Rural Bangladesh

Introduction

Respiratory distress is a common medical emergency responsible for 30-40% of admissions in the neonatal period (1) In the last 30 years, reductions in neonatal mortality have not kept pace with those beyond in the month of life (2) 47% or an estimated 2.4 million of all childhood deaths occur in the newborn period, with births occurring before 32 weeks gestation carrying the highest risk of death (3,4). Certain risk factors increase the likelihood of neonatal respiratory disease. These factors include prematurity, meconium-stained amniotic fluid, post dated ,prolong and obstructed labour. Failure to readily recognize symptoms and treat the underlying cause of respiratory distress in the newborn can lead to short- and long-term complications, including chronic lung disease, respiratory failure ,and even death. Perinatal Pneumonia is the most common form of neonatal pneumonia and is acquired at birth. Group B streptococcus (GBS) is the most common organism that affects term infants.(5,6) Congenital pneumonia occurs when the causative organism is passed transplacentally to the fetus. The most common pathogens are rubella, cytomegalovirus, mumps, toxoplasma gondii, treponema pallidum,

1. Dr. (Lt Col) Jannatul Ferdous
Classified Child specialist, Pediatric cardiologist, Head of Department , CMH, Sylhet.
2. Dr. (Col) Harun Or Rashid
Classified Medicine Specialist, Medical Oncologist, Head of Department, CMH, Cumilla.
3. Dr. Mohammad Tariqul Islam
Associate Professor, Physical Medicine & Rehabilitation Bangabandhu Sheikh Mujib Medical University, Dhaka.
4. Dr. Khaleda Ferdous
lecturer, Department of Pathology, Bangladesh University of Health Sciences, Dhaka.

Correspondence to:
Dr. (Lt Col) Jannatul Ferdous
Classified Child specialist, Pediatric cardiologist
Head of Department, CMH, Sylhet.
Email: ferdousjannatul922@gmail.com

mycobacterium tuberculosis, listeria monocytgenes, varicella zoster, and human immuno-deficiency virus (6). The underdeveloped respiratory cilia and the decreased number of pulmonary macrophages result in decreased clearance of pathogens from the respiratory system. Newborns also have diminished cellular and humoral immune functions, which are even more pronounced in the premature infants (7). Strong evidence reveals an inverse relationship between gestational age and respiratory morbidity (8,9). Respiratory distress in the newborn is recognized as one or more signs of increased work of breathing, such as tachypnea, nasal flaring, chest retraction, or grunting (10,11). Normally, the newborn's respiratory rate is up to 60breaths per minute. Tachypnea is defined as a respiratory rate greater than 60 breaths per minute (11). Tachypnea is a compensatory mechanism for hypercarbia, hypoxia or acidosis (12) Noisy breathing may indicate increased airway resistance, and the type of noise auscultation such as grunting, stridor and wheezing may help to localize airway obstruction (13). Despite the poor availability of effective management and poor response to initial treatment of neonatal respiratory distress and hypoxia represents a major challenge for clinicians and requires early identification and intervention. This article discusses the early detection of risk factors and timely intervention of these presentation and outcome among hospitalized sick neonates in CMH, Sylhet.

Materials and Methods

A retrospective study was conducted in sick neonates immediate after delivery at combined military hospital, Sylhet with 300 beds, between April 2021 and October 2022. The pediatric unit provides emergency service who need prompt admission and management.

For the particular study, out of 917 inborn neonates 224 neonates were admitted. A thorough history taken for identifying risk factors associated with common causes of neonatal respiratory distress and hypoxia. Together with former and present obstetric history, gestational age, birth weight, presence of maternal diseases, mode of delivery, exposure to antenatal steroid ,initial evaluation and need for resuscitation were documented. Apgar score, birth weight and gestational age was assessed by modified Ballard Score .Symptomatic neonates after birth with or without significant hemodynamic abnormalities were included. Inclusion criteria of symptomatic patients were based on the following definitions--a. The respiratory symptoms included-tachypnea, retraction, hypoxia, increased work of breathing or feeding difficulty b. persistent dependency on respiratory support including supplemental oxygen or continuous positive airway pressure (CPAP) or with convulsion and desaturation. All neonates were evaluated by paediatrician and paediatric cardiologist, including clinical, laboratory and by thransthoracic echocardiographic assessment. Those neonates referred from other peripheral hospitals were not included in this study. Inform written consent was taken from parents before admission.

The study was approved by the Institutional review Board of the hospital. Data collected through parent's interview by semi structured questionnaire. The processed data were analyzed by using Statistical Package for social Sciences (SPSS, version 21).

Results

Out of 917 neonates 224 were identified and admitted as a emergency cases immediate after delivery . 174 (77.6%) babies born by caesarean section. 50 (22.3%) by spontaneous vaginal deliveries .Immediately after admission around all cases were assessed for hypoxemia, hypoglycaemia and hypothermia. Around 66% were hypoxemic (preterm 71.4%, 22.3% in full term and 6.2% in post term) Mean gestational age was 35.5±3 wks (range 29 to 42 weeks). The incidence of respiratory distress in preterm baby with birth weight 1500-2500 gm is only 21.4 %, whereas in patients with birth weight <1000 gm, the incidence is several fold higher at 50% .There was male predominance 55% .

Table 1: Distribution of enrolled patients by perinal history perinatal history (n=224)

Enrolled patients	Perinatal history
TTN (8%)	Late preterm, gestational diabetes ,caesarian section
Congenital pneumonia (4.9%)	H/o maternal fever ,PROM >18, h/o maternal fever with rash
RDS (35.7%)	Prematurity, gestational diabetes, male baby, h/o meconium stained liquor
MAS (8.9%)	Post dated baby, h/o foetal history
PNA (3.5%)	H/O less foetal movement, foetal bradycardia
CHD (PDA,VSD), PPHN) (20.4%)	H/O maternal rubella infection during pregnancy, prematurity, maternal diabetes mellitus
Neonatal convulsion (1.75%)	Maternal diabetes mellitus , h/o less foetal movement
Septicemia (16.9%)	Maternal UTI , PROM>18 hours

Respiratory distress syndrome (RDS) was found to be the commonest 35.7% causes followed by persistent pulmonary hypertension with large patent ductus arteriosus (PPHN with PDA) 17.8% ,septicemia 16.9%, meconium aspiration syndrome (MAS) 8.9%, transient tachypnea of newborn (TTN) 8%, congenital pneumonia 4.4%, perinatal asphyxia (PNA) 3.5%, large atrial septal defect (ASD) with ventricular setal defect (VSD) 2.6% and 1.75% was hypoglycemic.

Table 2: Distribution of diseases by requirement of emergency management immediate after delivery (n=224)

Diseases	Number	Percentage
TTN	18	8.03%
RDS	**80**	**35.71%**
PPHN with Large PDA	40	17.85%
Congenital pneumonia	10	4.46%
MAS	20	8.92%
PNA	8	3.57%
Neonatal convulsion	4	1.75%
PPHN with Large VSD	6	2.67%
Septicemia	38	16.96%

A detailed physical examination was done to focus beyond the lungs to identify non-pulmonary causes like cardiac ,neurological or anatomical causes that may initially present as respiratory distress in a newborn. Careful inspection and auscultation are important. Signs of increased work of breathing (WOB) such as tachypnea ,nasal flaring, retractions, bilateral and equal aeration of the lung and breath sounds, and the presence of cyanosis ,was evaluated. Transthoracic echocardiography were performed to determine the type, shape and size of the congenital heart diseases.

Table 3: Distribution of examination & investigation by findings of respiratory, cardiac and neurological causes.

Examinations & investigation	Respiratory causes (57.12%)	Cardiac causes (20.52%)	Neurological cause (3.57%)
Physical examination	Temperature instability Tachypnea Chest indrawing Grunting Hepatomegaly	Tachypnea Tachycardia Chest indrawing Grunting Cyanosis Abnormal heart sound Added heart sound Hepatomegaly	Grunting Tachypnea Chest retraction
Chest radiograph	Patchy opacities Ground glass appearance Consolidation	Cardiomegaly Plethoric lung field Pulmonary conus full	Normal

Initial respiratory support given ,all babies required high flow oxygen by head box 224 (100%) ,subsequently Bubble CPAP and mechanical ventilation was required in 90 (40.1%) and 1(0.44%) cases respectively .Vascular access was established in all cases and 6(2.6%) neonates received medications by central femoral line. 22.3% was on inotropic support and 8.9% was on diuretics. Careful consideration of non-pharmacological measures e.g fluid restriction and optimizing nutrition (Table 4).

Out of 224 patients 98% preterm and 98% term baby survived after management and 100% post term baby was survived. (Table 5)

Table 4: Shows Distribution of required treatment among enrolled neonates (multiple response)

Treatment required	**No. of neonates**
High flow oxygen through head box	134 (59.8%)
Bubble CPAP	90 (40.1%)
Mechanical ventilation	01 (0.44%)
Inotropes/vasodilators	50 (22.3%)
Diuretics	20 (8.9%)
Central (Femoral line)	6 (2.6%)

Table 5: Distribution of patient's condition by outcomes after management

Patient's condition	Total number	Outcome after management		
		Survived	Referred to tertiary centre	Died
Preterm	160 (71.4%)	157 (98%)	2	1
term	50 (22.3%)	49 (98%)	--	1
Post term	14 (6.2%)	14 (100%)	--	--

Discussion

Childhood mortality is predominantly driven by deaths in the neonatal period (the first 28 days of life)(14). The complications of prematurity are the leading cause of neonatal mortality worldwide, with the highest burden in the low –and middle-income countries. Fifteen percent of term infants and 29% of late preterm infants admitted to the neonatal intensive care unit develop significant respiratory morbidity ;this is even higher for infants born before 34 weeks' gestation (15). The causes of respiratory distres in a newborn are diverse and multisystemic. Pulmonary causes may be related to alterations during normal lung development or transition to extrauterine life.More common respiratory diseases, such as TTN, RDS, Pneumonia, MAS persistent pulmonary hypertension (PPHN) in newborn (16,17). Cardiovascular disease may be difficult to distinguish from pulmonary causes of respiratory distress. Timing may be an important clue to differentiation because very few congenital heart defects present immediately after birth; more often they present several hours to days after delivery as the ductus arteriosus closes(15). In the present study, the most common causes of respiratory distress was respiratory causes like-RDS(35.71%),TTN (8.03%), Congenital Pneumonia (4.46%), MAS (8.92%) . Second most common causes was congenital acyanotic heart diseases (20.52%). Other causes were PNA (3.75%), Septicemia (16.9%) and neonatal convulsion (1.75%) due to hypoglycemia. RDS was the commonest (35.71%) cause of respiratory distress and desaturation and more common in preterm babies. Among the neonates with RDS 85% were preterm and their gestational age was 31 weeks,and their mean weight was 1300 gm.The incidence of RDS is inversely related to gestational age . It occurs in 98% of preterm infants between 22 and 24 weeks gestation but only 25% of those with birth weight between 1251 to 1500 grams (18). Respiratory distress syndrome (RDS), which results from lung immaturity and surfactant deficiency, contributes about 45% of case-fatality due to prematurity in lower middle income countries (19). TTN was another cause of 8.03% of respiratory distress in this study.Most of them delivered by cesarean section and term babies. In many study, TTN is the most common cause respiratory distress (20). We found septicemia as the 16.96% causes of respiratory distress and desaturation. Perinatal asphyxia 3.57% and congenital pneumonia 4.46% were other causes of respiratory distress. Perinatal asphyxia and congenital pneumonia still remains the major causes of neonatal respiratory distress (21, 22). Oxygen treatment started immediate after delivery with hoods and nasal cannulas to achieve targeted SPO2 values or to decrease work of breathing. Babies should not be allowed to become significantly acidic (pH<7.25) without escalating support (23). Assisted ventilation in the form of bubble CPAP (bCPAP) was required in90 (40.1)% and mechanical ventilation in 1 (0.44)% cases respectively. Mortality was 2 (0.89)% who required mechanical ventilation associated with multiple congenital anomali with septicemia . One study showed that 83.2% cases of RDS required ventilator support and mortality rate was 76.0% who put on IMV mode (22). No death was observed in cases required bubble CPAP. CPAP decreases the risk of chronic lung disease , one of the major sequelae of RDS that often requires the baby receive pulmonay care up to or beyond term-corrected age (24) . Out of 224 neonates , 220 (98.21%) of them were discharged with improvement, only 2 patients were found to have died and 2 patients referred to tertiary care hospital. Term baby were more likely to recover as compared to preterm babies .

Limitations of the study

The study has several limitations as the study was conducted at only a single centre's ample size was small and carried out in a defined neonates. It may not reflect the other civil or military hospital of rural area of the country.

Conclusion

The present study showed that the majority of the patients admitted with medical emergencies had a good treatment outcome. Many neonatal serious conditions may vary in presentation, the promptly recognition and knowledge of atypical features can improve the approach and give an earlier diagnosis. Small and sick newborns need high-quality inpatient management and care at the right time and in the right place.

Conflict of Interest: No

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