Original Article

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A Study on Immediate outcome in Late Preterm Neonates at Tertiary Care Hospital

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Abstract

Introduction: Surfactant replacement therapy is one of the best studied therapies in neonates. It has been shown in numerous clinical trials to be successful in ameliorating RDS. These trials have examined the effects of surfactant preparations delivered through the endo tracheal tube either within minutes of birth(prophylactic treatment) or after the symptoms and signs of RDS are present (selective or "rescue" treatment). *Methodology:* Details regarding maternal risk factors were collected by detailed history taking and the medical records with them. The infants in the sample were followed throughout their stay in the SNCU and postnatal wards, up until hospital discharge. Data were collected from infants and mothers medical records and supplemented with additional information collected at discharge using a structured form covering the variables of interest. Variables relating to the mothers and their infants were analyzed *Results:* Regarding respiratory morbidities, 34 neonates presented with respiratory distress secondary to pneumonia which accounts for 2%. 2 of the neonates presented as TTNB which accounts for about 2%. 62 neonates didn't have any respiratory distress which accounts for about6 2%. *Conclusion:* Birth asphyxia constitutes the second most morbidity with 41 neonates affected which constitute about 41%. A large number of the infants in this study had respiratory distress 34%, followed by Pneumonia and TTN.

Keywords: Birth Asphyxia; Pneumonia; RDS.

Introduction

Latepreterm infants have not been studied frequently and understanding of the developmental biology and mechanisms of disease experienced by these infants is largely incomplete.

Management strategies, therefore, are based on general principles, clinical experience and extrapolation from knowledge of very preterm and terminfants. Recently, descriptive studies that detailed the epidemiology, medical problems and risk of mortality experienced by late-preterm infants have stimulated interest in exploring the comparative biology and basic mechanisms of disease in these infants. Several important factors that may predispose latepreterm infants to medical conditions associated with immaturity, such as respiratory distress, apnea, temperature instability, hypoglycemia, hyperbilirubinemia and poor feeding [1].

The keys to the management of infants with RDS are (i) to prevent hypoxemia and acidosis (this allows normal tissue metabolism, optimizes surfactant production, and prevents right-to-left shunting); (ii) to optimize fluid management (avoiding hypovolemia and shock, on the one hand and edema, particularly pulmonary edema, on the other); (iii) to reduce metabolic demands; (iv) to prevent worsening atelectasis and pulmonary edema; (v) to minimize oxidant lung injury; and (vi) to minimize lung injury caused by mechanical ventilation. Surfactant replacement therapy is one of the best studied therapies in neonates.It has been shown in numerous clinical trials to be successful in ameliorating RDS. These trials have examined the effects of surfactant preparations delivered through the endo tracheal tube either within minutes of birth (prophylactic treatment) or after the symptoms and signs of RDS are present (selective or "rescue" treatment) [2].

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Transient tachypnea of the newborn (TTN), otherwise known as wet lung, is observed clinically as a relatively mild, self-limited disorder most commonly affecting infants who are born at or near term gestation. The disorder is characterized by tachypnea with signs of mild respiratory distress including retractions and cyanosis; decreased oxygen saturation is usually alleviated by supplemental oxygen with FiO_2<0.40.

The transition to air breathing requires rapid clearance of fetal lung fluid,which is mediated primarily by transepithelial sodium reabsorption through amiloride-sensitive sodium channels in the alveolar epithelial cells. This is likely facilitated by the changes in the maternal-fetal hormonal milieu that normally accompany the onset of spontaneous labor at term. Disruption or delay in clearance of fetal lung liquid due to a number of conditions results in the transient pulmonary edema that characterizes TTN. Retained fluid accumulates in the peribronchiolar lymphatics and bronchovascular spaces, causing compression and bronchiolar collapse with are as of air trapping and hyperinflation. These changes result in a net decrease in lung compliance accounting for the clinical manifestations of the condition.

Premature birth, precipitous birth and operative birth without labour have all been associated with an increased risk of TTN. This has been attributed to altered sodium transport and associated abnormal fluid clearance possibly due to the absence of hormonal changes that normally accompany the onset of spontaneous labour. Delayed cord clamping or cord milking, promoting placental-fetal transfusion, leads to an elevation in the infant's central venous pressure, disrupting clearance of fluid by the thoracic duct or pulmonary lymphatics, is also associated with TTN. Additional risk factors in clude male gender and birth to an asthmatic mother. The mechanism underlying the gender associated risk and the increased association with maternal asthma is unclear although there is speculation that these infants have an altered sensitivity to catecholaminees that may play a role in delayed clearance of lung fluid. Macrosomiaand multiple gestations also increase the risk of TTN. The associations between TTN and other obstetric factors such as excessive maternal sedation, prolonged labour and complications resulting in administration of large amount so intravenous fluids to the mother have been less consistent.

Affected term or latepreterm infants present within the first 6 hours of birth with tachypnea; respiratory rates are typically >80 breaths/minute.

- The tachypnea is accompanied by mild to moderate respiratory distress with cyanosis, subcostal retractions and increased anteroposterior diameter of the chest secondary to air trapping. These signs are accompanied by nasal flaring and expiratory grunting, reflecting the effort to compensate for decreased lung compliance.
- Auscultation usually reveals good air entry and crackles may or may not be apreciated.TTN usually occurs in the absence of cardiac,central nervous system (CNS), hematologic or metabolic causes of respiratory distress. As the care of the infant of TTN is primarily supportive, it is important to rule out these other sources of respiratory distress that require more targeted and aggressive intervention.
- Signs of TTN usually persist for 12 to 24 hours in cases of mild disease, but can last up to 48 to 72 hours in more severe cases.
- In premature infants,TTN may accompany respiratory distress syndrome (RDS) caused by surfactant deficiency. Retained fetal lung liquid may complicate surfactant administration due to heterogeneous lung
- Expansion leading to further decreases in lung compliance and areas of air trapping. These factors may combine to result in increased requirements for ventilator support and supplemental oxygen.3,4,5.

Methodology

Gestational age was assessed by Modified Ballard score Among preterm, late preterm ($34^{0/7}$ –$36^{6/7}$ weeks) were selected after taking consent from parents. If neonate is admitted after 2 days of life, gestational age will be assessed from LMP date and ultrasonography evidence. For hypothermia, hypoglycemia, hyperbilirubinemia, respiratory insufficiency, birth asphyxia, sepsis, feed intolerance well established definitions were used. Regarding rehospitalisation, duration considered was within one month of age.

Details regarding maternal risk factors were collected by detailed history taking and the medical records with them. The infants in the sample were followed throughout their stay in the SNCU and postnatal wards, up until hospital discharge. Data were collected from infants and mothers medical records and supplemented with additional information collected at discharge using a structured

form covering the variables of interest. Variables relating to the mothers and their infants were analyzed

The maternal and gestational variables studied were: Age (years), number of pregnancies, prior history of miscarriages, still births and premature deliveries; type of delivery (normal or caesarean); previous caesarean section, intercurrent clinical conditions observed during gestation–diabetes, hypertension, anemia, urinary infections at any point during pregnancy, syphilis, human immunodeficiency virus (HIV), toxoplasmosis, heart disease, hepatitis B,premature rupture of membranes (PROM) for longer than 18 hours, placental abruption. The neonatal variables studied were: Age at admission, days in hospital, sex, birth weight; gestational age (Calculated from modified Ballard's scoring); hypothermia/ hyperthermia (hypothermia: body temperature below 36ºC, hyperthermia: temperature above 37.5 ºC); hypoglycemia (glucose below 40 mg/dL); hyperbilirubinemia requiring phototherapy/ exchange transfusion; feed intolerance; respiratory pathologies–transient tachypnea of the newborn (TTN), hyaline membrane disease (HMD), pneumonia, sepsis,interventions done, deaths, rehospitalizations. Diagnostic criteria for each neonatal problem are applied concurrently by neonatologists as follows [6]:

TTN: clinical and radiographic features identified during the first hours of life, followed by characteristic resolution during the subsequent 24–48 hours.

BIRTH ASPHYXIA: Inability to initiate and sustain respiration at birth (WHO) or gasping and inadequate /no breathing or with APGAR of < 4 at 1 minute (NNF).

NEONATAL SEPSIS: Probable sepsis: Positive sepsis screen (two of the five parameters namely, TLC <5000/mm3 or >15000/mm3, band to total polymorph ratio of >0.2, absolute neutrophil count less than 1800/mm3 or >7200/mm3, C reactive protein >0.5mg/dL, platelets <1 lakh/mm3); or Proven sepsis: Isolation of pathogens from blood, CSF or pus.

Hypoglycemia: Blood glucose level below 40 mg/dl.

Hypothermia: Rectal temperature <36^{0}Celsius.

Neonatal Hyperbilirubinemia: Clinically visible jaundice requiring phototherapy/exchange transfusion as per hour specific total serum bilirubin (TSB) normogram (AAP chart).

Respiratory Insufficiency diagnosed by the presence of tachypnea, flaring of the nasal alae, grunting or retractions of the chest wall, oxygen requirement for more than two hours after birth and requirement of positive pressure ventilation. Relevant laboratory investigations will be done.

Feed Intolerance:

Presence of gastric aspirate that was more than half of previous feeding or with abdominal distension was recorded as feeding difficulties in the absence of respiratory distress and septicemia. Hospital outcome will be assessed in the form of morbidity, mortality, other complications and rehospitalization following discharge.

Results

Table 1: Hypothermia

Hypothermia	No. of Patients	%
Absent	84	84
Present	16	16
Total	100	100

Regarding hypothermia, 16 neonates had hypothermia which accounts for16%

Table 2: Incidence of hypoglycaemia in patients studied

Hypoglycemia	No. of Patients	%
Absent	74	74
Present	26	26
Total	100	100

Regarding hypoglycemia, 26 neonates had hypoglycaemia which accounts for 26%

Table 3: Incidence of hyperbilirubinemia in patients studied

Hyperbilirubinemia	No. of patients	%
Absent	32	32
Present	68	68
Total	100	100

Regarding hyperbilirubinemia, 68 neonates had hyperbilirubinemia which accounts for about 68%

Table 4: Incidence of feed intolerance in neonatesstudied

Feed intolerance	No. of patients	%
Absent	81	81
Present	19	19
Total	100	100

Regarding feed intolerance, 19 neonates had feed intolerance which accounts for about19%.

Table 5: Respiratory morbidities

Respiratory Morbidities	No. of Patients	%
Normal	62	62
RDS	34	34
Pneumonia	2	2
TTN	2	2
Total	100	100

Regarding respiratory morbidities, 34 neonates presented with respiratory distress secondary to pneumonia which accounts for 2%. 2 of the neonates presented as TTNB which accounts for about 2%. 62 neonates didn't have any respiratory distress which accounts for about6 2%.

Table 6: Birth asphyxia

Birth asphyxia	No. of patients	%
Absent	59	59
Present	41	41
Total	100	100

Regarding Birth asphyxia, 41 neonates had birth asphyxia which accounts for about 41 %.

Table 7: Morbidities of late preterm

Morbidities	A Leone etal[6]	AshishJaiswal etal[7]	Margreet J. Teune etal[8]	Present study
Any morbidities	70%	70.8%	-	-
Hyperbilirubinaemia	47.7%	55.1%	23.5%	68%
Respiratory distress	34.7%	10.5%	11%	34%
Sepsis	-	5.2%	20.06%	68%
Feed intolerance	8.3%	-	34%	19%
Hypothermia	2.5%	-	1.5%	16%
Hypoglycemia	14.3%	8.8%	7.1%	26%
Mechanical ventilation	7.9%	3%	8%	-
Birth asphyxia	-	-	-	41%
AOP	7.2%	-	0.87%	24%

Discussion

In the present study, hyperbilirubinemia & Sepsis constitute the major group with 68 neonates affected which constitute about 68%. All Neonates with Hyperbilirubinaemiarequired phototherapy and one neonate required exchange transfusion to reduce hyperbilirubinemia along with phototherapy.68 babies had sepsis (68%), 41 babies had Birth asphyxia (41%), 34 babies had RDS (34%).

Birth asphyxia constitutes the second most morbidity with 41 neonates affected which constitute about 41%. A large number of the infants in this study had respiratory distress 34%, followed by Pneumonia and TTN. Which demonstrates the immaturity of these new born's respiratory systems. Surfactant was given to few RDS neonates and required mechanical ventilation during the hospital stay.

Third common morbidity was Respiratory Distress which was found in 34 neonates which constitute 34%. A significant number of infants had hypothermia, hypoglycemia, feed intolerance, apnea of prematurity and

A Leone et al, in 2012 conducted a study regarding "Neonatal morbidity in single ton latepreterm infants compared with full-term infants". In this retrospective multicentre study, electronic data of children born at five hospitals in Switzerland were recorded. Short-term outcome of latepreterm infants were compared with a control group of full-term infants (390/7 to 406/7 weeks of gestation). Data from 530 latepreterm and 1686 full-term infants were analyzed.

Compared with full-term infants, late preterm infants had a significant higher morbidity: respiratory distress (34.7% versus 4.6%), hyperbiliru binaemia (47.7%versus 3.4%), hypoglycemia (14.3% versus 0.6%), hypothermia (2.5% versus 0.6%), duration of hospitalization (mean9.9days versus 5.2days). The study concluded single ton late preterm infants show considerably higher rate of medical complications and prolonged hospital stay compared with matched full-term infants and there for need more medical and financial resources.

Conclusion

Late-preterm infants are a high risk group of children and need special attention while in hospital, including delayed discharge and follow-up very soon after discharge.

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