

Research article

Outcome of neonates with idiopathic respiratory distress syndrome; where do we go wrong?

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This study focuses on assessing the modifiable risk factors, which are aetiologic in IRDS and the outcome of children who were treated with surfactant therapy.

Methods

All neonates received by the neonatal intensive care of Anuradhapura teaching hospital with early onset respiratory distress leading to surfactant therapy and among whom chest roentgenograms were supportive of a diagnosis of IRDS, were recruited to study. Appropriate information regarding antenatal and perinatal care, NICU management, complications, and outcomes were collected using a structured questionnaire by the investigators prospectively for one year from January 2012 and retrospectively for the calendar year 2011.

Results

Seventy one neonates were treated for two year study period and 45(63.4%) were males. Antenatal problems included poor antenatal follow up 5(7%) and bad obstetric history 3(4.2%) with only 52 (73.2%) mothers receiving antenatal steroids. Perinatal problems included eclampsia 8 (11.3%), abruption 5(7%) and fetal distress 2(2.8%) with 23(32.4%) children needing resuscitation at birth. The proportion of pulmonary haemorrhage following surfactant was 14/71(19.7%). Twenty three children (32.4%) were discharged lively and successfully, while 48 children (67.6%) succumbed secondary to extreme prematurity (maturity < 28 weeks) and IRDS 34(70.8%), pulmonary haemorrhage 8(17%), septicaemia 8(17%), and severe birth asphyxia 2(4.1%).

Conclusions

Antenatal glucocorticoids to preterm deliveries, management of maternal medical problems, and control of sepsis in NICU need further improvement to optimize care and to bring down neonatal mortality following IRDS. As pulmonary haemorrhage following surfactant therapy remains a significant factor in increasing neonatal mortality and reducing the weight of the recognized beneficial effects of surfactant, effectiveness of these low cost interventions should be further evaluated.

Key words: Idiopathic respiratory distress syndrome; Anuradhapura Teaching Hospital; Neonates

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Introduction

Neonatal neurological intensive care unit (NICU) of Teaching hospital Anuradhapura receives neonates from all obstetric units of the hospital as well as peripheral units of the district and many require surfactant therapy for idiopathic respiratory distress syndrome (IRDS). Most of these neonates are premature and born with a very low birth weight. Immaturity of organ systems among premature neonates with sustained hypoxia secondary to IRDS can lead to multiple complications involving cardiovascular and central nervous systems, kidneys, respiratory and gastrointestinal tracts(1).

Respiratory distress syndrome remains a major cause of morbidity and mortality in preterm infants, especially in the extremely low birth weight infants (birth weight <1000 g)(2). The incidence of RDS is inversely proportional to gestational age (3,4). With the increasing use of prenatal steroids, the incidence as well as the severity of RDS has decreased by nearly 50% over the last few years (5, 6).

Treatment with surfactant for preterm neonates with IRDS reduces the severity of respiratory distress during the 72 hours after treatment and decreases the frequency of pneumothorax. However it does not significantly improve clinical outcomes later in the neonatal period and does not reduce neonatal mortality (7).

However treatment with surfactant is not without risk. The risk of pulmonary hemorrhage increases slightly, on an average of 47%, with any surfactant therapy. This increased risk is small compared to the documented benefits of surfactant therapy in respiratory distress syndrome (8).

Given this background the study was conducted to assess the modifiable risk factors which are aetiologic in IRDS and the outcome of children who were treated with surfactant therapy, the complications including fatal pulmonary haemorrhage following surfactant therapy and causes for mortality among preterm neonates treated with surfactant for IRDS.

Methods

All neonates received by the neonatal NICU of Anuradhapura teaching hospital with early onset respiratory distress leading to Surfactant therapy and among whom chest roentgenograms were supportive of a diagnosis of IRDS, were recruited to study. All chest roentgenograms were reported by the Consultant Radiologist and the need for treatment with surfactant was decided by the Consultant Paediatrician in charge of the neonatal NICU. Criteria for treatment with surfactant treatment was early onset respiratory distress with moderate or severe degree IRDS as evident in chest roentgenogram. When indicated surfactant was given at a dose of 4 ml/ kg at least within 24 hours in all children.

All surfactant treatments were delivered by medical officers skilled in neonatal intensive care and natural modified surfactant which is associated with better outcome (9), was prescribed to all neonates rather than non-protein containing synthetic surfactants.

Selected information regarding antenatal and perinatal care with the emphasis on correction of modifiable risk factors, the quality of NICU management, complications developed during NICU care and the outcome were collected using a structured questionnaire by the investigators. In succumbed neonates where the cause of death was not obvious the cause of death reported by the Consultant Judicial Medical Officer was considered as the cause of death.

Data were collected prospectively for one year from January 2012 to January 2013 and retrospectively for the calendar year 2011, completing a study period of two years (From January 2011 to January 2013).

Results

Seventy one neonates were treated with surfactant for two year study period and 45(63.4%) were males. Mean birth weight and maturity were 1.28 kg (Range 0.68kg – 2.3kg) and 28/52 (Range 25/52 – 35/52) respectively. (Figure 1) (Table 1)

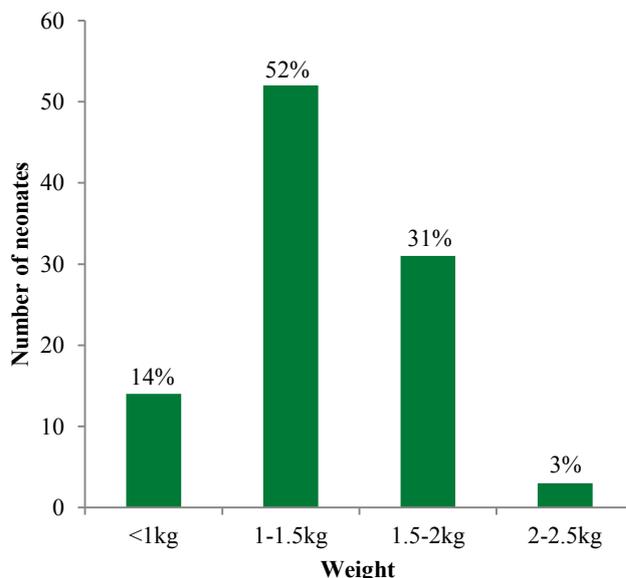


Figure 1 Birth weight distribution of the study sample

Table 1 Maturity distribution of the study sample

Reported cause for mortality	Number	Percentage (%)
< 28 weeks	8	11
28-32 weeks	42	59
32-36 weeks	17	24
>36 weeks	4	6

Missing of three or more regular monthly antenatal clinic visits by the child’s mother was considered poor antenatal follow up and it was observed in 5 (7%) patients. Mothers of three children (4.2%) had bad obstetric history. Only 73.2% received antenatal steroids. Twenty children (28.1%) were transferred from peripheral hospitals and it also included five in utero transfers.

Seventy percent had been planned deliveries by either elective lower segment caesarian section or induction. Fourteen percent had been delivered by emergency caesarian section and without adequate time available for prescription for antenatal steroids.

Perinatal problems included eclampsia 8 (11.3%), abruption 5(7%) and fetal distress 2(2.8%) with 23(32.4%) children needing resuscitation at birth. Two neonates (2.8%) had IRDS due to intrapartum brain hypoxia and they were born at term (>37 weeks).

The proportion of pulmonary haemorrhage following surfactant was 14/71(19.7%).

Twenty three children (32.4%) were discharged lively and successfully while 48 children (67.6%) succumbed secondary to extreme prematurity (maturity < 28 weeks) and IRDS 34(70.8%), pulmonary haemorrhage 8(17%), septicemia 8(17%), and severe birth asphyxia 2(4.1%).

Table 2 Time of the accidents

Reported cause of death	Number	Percentage (%)
Extreme prematurity	34	70.8
Pulmonary haemorrhage	8	17
Septicaemia	8	17
Severe birth asphyxia	2	4.1

Discussion

Antenatal steroids have emerged as the most effective intervention for prevention of neonatal IRDS (10). It has also been recognised as one of the most cost effective and feasible interventions in low and middle-income countries where mortality following preterm birth is higher (11, 12). In our study, the coverage of antenatal corticosteroids was only 73%. Therefore, it is of paramount importance that use of antenatal steroids should be encouraged as much as possible to bring down the incidence of IRDS.

Elective or emergency caesarian sections for maternal medical complications such as hypertension, heart disease are associated with a higher risk for poor lung maturation compared to normal vaginal delivery. We observed that 14% of caesarian sections were performed without a time being available for administration of antenatal steroids. Therefore it is important to plan them in advance with antenatal steroids whenever normal vaginal delivery is not possible.

Septicemia, meconium aspiration and intrapartum brain hypoxia are known causes of IRDS in term neonates (13). In our study 32% of neonates including extreme premature group needed resuscitation at birth and 2% had intrapartum brain hypoxia. Therefore, established measures such as regular monitoring of partogram and cardiotocographic monitoring of risk pregnancies during labor should be practiced optimally to enable timely delivery and reduce the need for resuscitation at birth.

Sepsis has been one of the leading causes for increased neonatal mortality, specially in the preterm age group (14, 15, 16). Poor development organ system, immunological immaturity and increased requirement for invasive interventions such ventilation and venous access keep

them at higher risk for hospital acquired infections. Septicaemia accounted for 17% of the neonatal deaths in our study. Simple measures such as strict adherence to hand hygiene, minimal handling, and clinical vigilance should be practiced as much as possible and will have a beneficiary effect in bringing down the burden of IRDS.

Surfactant replacement in preterm infants with respiratory distress syndrome (RDS) has been a major therapeutic breakthrough and many randomized controlled studies have found it to be associated with an improved outcome in the neonate specially when it is given as early as possible (17). However it is also known to be associated with pulmonary haemorrhage⁸. Given its high cost and the prevention of disease is always better than cure, the aforementioned concerns needs to be given a high priority.

Conclusions

Complications of maternal medical disorders led to iatrogenic preterm deliveries and the optimum control of them should be evaluated as means of bringing down neonatal mortality along with timely administration of antenatal corticosteroids. Intrapartum complications such as birth asphyxia were observed to cause respiratory distress syndrome in term neonates and optimal management labour should be considered to prevent neonatal outcomes of IRDS.

Majority of deaths were secondary to extreme prematurity and its complications and mortality was high despite surfactant being administered.

Seventeen percent of deaths were due neonatal septicemia and measures to control sepsis in intensive care settings should be evaluated.

The proportion of pulmonary haemorrhage and fatal pulmonary haemorrhage following surfactant were 19.7% and 17% respectively and pulmonary haemorrhage was associated with high mortality.

Recommendations

The authors recommend antenatal glucocorticoids to all preterm deliveries, optimum and timely management of maternal medical problems, labour and delivery, strict control of sepsis in NICU and surfactant therapy at the earliest opportunity to bring down neonatal mortality following IRDS.

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None

Competing Interests

None

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