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Review Article

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Effect of Surfactant therapy on clinical outcome of Respiratory Distress Syndrome in premature neonates at French Medical Institute for Mother and Children

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Abstract

Respiratory distress syndrome (RDS) of the newborn, also known as Hyaline Membrane Disease, is a breathing disorder of premature babies. In healthy infants, the alveoli—the small, air-exchanging sacs of the lungs—are coated by surfactant, which is a soap-like material produced in the lungs as the fetus matures in preparation for birth. If premature newborns have not yet produced enough surfactant, they are unable to open their lungs fully to breathe. As the efforts, our hospital is to deliver health services in a best manner to have high quality of service delivery and a low number of mortality, although the RDS is high in Afghanistan, and there is no any reliable data, which show major causes death during in-bed hospitalization. Gradually increment of mortality rate of Respiratory Distress Syndrome at French Medical Institute for Mother and Children, based on observational and unreliable accurate data, is higher among preterm neonates versus term neonates. We are going to have a retrospective study, which will be the first study in Afghanistan in such area.

Objective

To evaluate the effect of surfactant therapy on clinical outcome of RDS in neonates with prematurity (36-28weeks, BW ≥ 800 gr).

Methodology

Study Design:
We employed a retrospective, review study design.

Study Population

All premature neonates who are admitted with the diagnosis of Respiratory Distress Syndrome at NICU ward of FMIC.

Eligibility Criteria

Inclusion Criteria

Neonates who will be hospitalized due to prematurity (28-36weeks) and RDS.

Exclusion Criterion

Neonates who weighs less than 800grams

Sampling Strategy

Consecutive sampling will be utilized. All the records of neonates who are admitted between November 1st, 2018 to April 30th 2019 will be reviewed.

Data Collection

All records was reviewed and necessary data was extracted to the data collection and then it was transferred to a database to do analysis.

Data Analysis Plan

Statistical Package for the Social Sciences (SPSS) version 22 was used in order to analyze the data.

Results

30 (15 in the first group; INSURE+NCPAP and 15 in the second group (intubation and MV)) completed the study. The overall of gestational age was 28-34 weeks and the birth weight was >800 g. In general, (75%) cases were male, and (66.6%) mothers were primiparous. The most babies with birth weight of (1-1.5kg) were given surfactant. The two groups were matched regarding demographic and clinical characteristics. Unfortunately (33.33%) of single dose of antenatal corticosteroids was administered for mother. The most common complication of surfactant was pulmonary hemorrhage (8%). The mean Apgar score between the two groups was not well recorded. The time of gining surfactant was (2hr to >12hr) of birth and the most babies received surfactant with in (2-6hr) of life. The success rate in INSURE group was 64.4%, while condition of (35.6%) cases became worse and they underwent MV after INSURE failure. In MV group, (56%) survived at the end of study, while (11.1%) cases in the first group and (43%) cases of the second group died during the study. The most common cause of death was respiratory failure (46.42%), followed by sepsis (42.85%) and NEC (10.71%). INSURE method in all expired newborns of the first group was failed and they underwent respiratory support by MV. A significant difference was found between the two subgroups (successful and failure) among the patients of the first group (INSURE method) regarding birth weight, gestational age (GA), N.CPAP duration, lung bleeding, presence of necrotizing enterocolitis (NEC) and mortality. GA

was the only variable associated with duration of hospitalization between the two subgroups. In the INSURE group, prevalence of pneumothorax, lung bleeding, mortality and duration of need to O_2 support) were significantly lower than the MV group.

In addition, birth weight, presence of retinopathy of prematurity (ROP) and presence of lung bleeding could significantly predict death in the second group, although only birth weight had a significant influence on the mortality rate in the first group. The incidence of MV dependency (that was defined at least more than 2 days) in INSURE failure subgroup compared to the MV group was 37% and 83%, respectively, which indicated a statistically significant difference.

Discussion

Our findings showed that INSURE method with N.CPAP was safer and more effective than the routine method (Intubation plus MV after surfactant therapy) in VLBW children with RDS. Additionally, INSURE method was associated with lower mortality, morbidity rate and less dependency to MV during hospitalization, and the mentioned factors could be considered as success (efficacy) criteria compared with the previous study regarding efficacy and MV dependency. Previous reports compared the efficacy and safety of various methods of RDS management. There is a controversy to choose the best method for pulmonary support of neonates with VLBW and RDS. However, the efficacy of N.CPAP compared to permanent MV has been reported in previous studies but it is not clear when and how it should be used. Nowadays, positive airway pressure including N.CPAP has been used for the treatment of neonates with RDS after surfactant therapy. In the present study, repeated administration of surfactant versus single dose was not effective enough to change the rate of INSURE failure. Rate of INSURE failure in the present study was 35.6% similar to other studies. Arterial pressure of carbon dioxide, mean arterial-to-alveolar oxygen pressure ratio and severe radiological abnormalities were previously reported as risk factors for INSURE failure which are not coherent with the results of our study. In this study and after adjusting confounding variables, birth weight was found as the only risk factor for INSURE failure. In addition, pulmonary hemorrhage is one of the dangerous complications of MV among infants with RDS. Transient intubation and CPAP can somewhat reduce this problem. Study showed that the duration of hospitalization and adverse outcomes of preterm neonates with RDS treated with early intubation and surfactant administration were not significantly different with patients treated with routine protocol. In a systematic review, Stevens et al. concluded that the frequency of MV dependency, BPD and air leak syndrome in a group of neonates treated with early surfactant therapy and NCPAP were less than a group treated with delayed surfactant therapy and MV, and this finding is similar to our findings [1]. We also found that birth weight, rate of ROP, and presence of lung bleeding could be associated with neonatal mortality seen in the MV group and is concordant with previous reports. CPAP can enhance the frequency of hospitalization complications. There were some limitations in this study; first, our sampling method was consecutive method and our allocation method was simple allocation (using even and odd numbers). We had to use the most available methods for randomization and allocation. Second, we did not follow these cases for long time. Third, the follow-up duration should be more similar in both groups. There were some confounding factors such as age and Apgar score, which were neutralized by logistic regression models. The present study conducted to reply this important question that; "whether early administration of surfactant followed by quick extubation and NCPAP is better than surfactant therapy followed by continues MV". Our findings on preterm VLBW infants with RDS declared that INSURE method is related to lower need to supplementary O_2, mortality and the rate of pneumothorax compared to the routine strategy (surfactant therapy followed by MV). In addition, we concluded that BW is a valuable predictor for efficacy of treatment regardless of treatment methods in VLBW neonates with RDS [2-11].

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