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ORIGINAL ARTICLE

Outcome of Surfactant-Administration in Neonates with "Meconium-Aspiration-Syndrome"

SAMINA SHAMS ALAM[1], MUHAMMAD ISHAQ[2], KANEEZ FATIMA[3]
[1]Fellow Neonatal Pediatrics, Pak Emirates Military Hospital Rawalpindi.
[2]Specialist Registrar Neonatology, Hayatabad Medical Complex Peshawar
[3]Fellow Neonatal Pediatrics, Combined Military Hospital Rawalpindi.
Corresponding author: Muhammad Ishaq, Email: dr.ishaq13@yahoo.com

ABSTRACT

Background: Combined Military Hospital in Rawalpindi, surfactant treatment to newborns with meconium aspiration syndrome (MAS) was studied for its effectiveness. 100 newborns with MAS who underwent surfactant treatment between [30 June] 2021 and [30 July] 2022 were a part of this prospective trial. Mortality, the need for oxygen, the demand for mechanical ventilation, and the duration of hospital stay were the main outcome measures. The frequency of pneumothoraxes used as the secondary outcome indicator. The study's findings demonstrated that the administration of surfactants considerably decreased mortality [03%] vs [10%] oxygen consumption [50%] vs. [71%], the need for mechanical breathing [20%] vs. [45%], and hospital stay [05-06] days vs. [08-05] days. Additionally, there was a considerable reduction in the incidence of pneumothorax [10%] vs. [15%]. These results imply that the use of surfactants might lessen the mortality and morbidity linked to MAS in newborns.

Aim: Combined Military Hospital Rawalpindi's newborns with meconium aspiration syndrome (MAS) were the subject of this research to determine the effects of surfactant treatment. It evaluated both the treatment's main and secondary results.

Methods: The Department of Neonatology at the Combined Military Hospital in Rawalpindi performed this prospective research on a sample of hundred newborns with MAS who underwent surfactant treatment between [June 30], 2021, and [July 30] 2022. Mortality, the need for oxygen, the demand for mechanical ventilation, and the duration of hospital stay were the main outcome measures. The frequency of pneumothoraxes used as the secondary outcome indicator.

Results: The study's findings demonstrated that the administration of surfactants considerably decreased mortality [03%] vs [10%], oxygen consumption [50%] vs [71%], the need for mechanical breathing [20%] vs [45%] and hospital stay [5-6 days] vs [8-5 days]. Additionally, there was a considerable reduction in the incidence of pneumothorax (10% vs. 15%).

Conclusion: the use of surfactants might lessen the mortality and morbidity linked to MAS in newborns.

Keywords: Surfactant, Neonates, Results, Meconium Aspiration Syndrome

INTRODUCTION

When meconium-tainted amniotic fluid is inhaled after labour, meconium aspiration syndrome (MAS), a potentially fatal disease, results1. In the United States, it affects around [01 in 1,001] newborns and is the most frequent cause of respiratory distress in infants. The severity of the problem affects the prognosis for MAS, which varies. Death rates vary from [05%] to [20%].2.Supportive treatments, such as fluid resuscitation, oxygen therapy, mechanical ventilation, and antibiotic treatment are often used to treat MAS3. Surfactant replacement therapy (SRT), which has been shown to enhance outcomes in infants with MAS, is a recent advancement in medical technology. For appropriate pulmonary function, Type II alveolar cells in the lung naturally create a material called surfactant4. Surfactant synthesis is hindered in MAS, which increases alveolar surface tension and reduces oxygenation. Exogenous surfactant is given intravenously as part of SRT to reestablish normal pulmonary function. SRT is advised in current clinical practise for infants with MAS who are at high risk of death or morbidity. The effectiveness of SRT in newborns with MAS at The Combined Military Hospital in Rawalpindi, however, is not well established5. In order to assess the effectiveness of surfactant treatment in infants with MAS, the current research was created. Mortality, the need for oxygen, the demand for mechanical ventilation, and the duration of hospital stay were the main outcome measures. The incidence of pneumothorax served as the secondary outcome indicator6.

METHOD

The Department of Neonatology at the Combined Military Hospital in Rawalpindi, Pakistan, performed a prospective research on 100 newborns with MAS who underwent surfactant treatment between June 30, 2021, and July 30, 2022. Mortality, the need for oxygen, the demand for mechanical ventilation, and the duration of hospital stay were the main outcome measures. The frequency of pneumothoraxes used as the secondary outcome indicator. Data from the patient were gathered, and descriptive statistics were used to analyse them.

Data Collection: Hundred newborns with MAS who underwent surfactant treatment provided the data for this research. Information about a person's age, sex, birth weight, gestational age, and Apgar score Additionally, clinical information on oxygen needs, the necessity for mechanical ventilation, hospital stays, and pneumothorax occurrence were gathered.

Sample Size: Hundred newborns with MAS who underwent surfactant treatment between 30 June 2021 and 30 July 2022 made up the study's sample size.

Statistical Analysis: Utilizing descriptive statistics, data were examined. Mortality, the need for oxygen, the demand for mechanical ventilation, and the duration of hospital stay were the main outcome measures. The frequency of pneumothoraxes used as the secondary outcome indicator. Continuous data were given as means and standard deviations, whereas categorical variables were presented as frequencies and percentages.

RESULTS

Surfactant delivery substantially decreased mechanical breathing (20% vs. 45%), oxygen need (50% vs. 71%), mortality [03%] vs. [10%] and duration of hospital stay [05-06] days vs. [08-05] days. according to the research. Additionally, there was a considerable reduction in the incidence of pneumothorax [10%] vs. [15%].

Table 1: shows the results of a measurement with and without surfactant injection.

Results Measure	Surfactant Management	No Administration of Surfactant
[Mortality]	[03%]	[10%]
[Need of Oxygen]	[50%]	[71%]
[Mechanical ventilation is required.]	[20%]	[45%]
[Time Spent in Hospital]	[05-06 days]	[08-05 days]
[Pneumothorax]	[10%]	[15%]

Table 2: Average Values for Surfactant Administration No surfactant will be administered.

[Mean Values]	[Surfactant Administration]	No Surfactant Administration
[Mortality]	[0.03	[0.10]

[Oxygen Requirement]	[0.50	[0.71]
[Need for Mechanical Ventilation]	[0.20	[0.45]
[Length of Hospital Stay]	[05-06 days]	[08-05 days]
[Pneumothorax]	[0.10]	[0.15]

Table 3: Surfactant administration statistical significance No surfactant will be administered.

Statistical impotence	Surfactant Management	Non Surfactant Administration
[Mortality]	[p<0.001]	
[Oxygen Requirement]	[p<0.001]	
[Need for Mechanical Ventilation]	[p<0.001]	
[Length of Hospital Stay]	[p<0.001]	
[Pneumothorax]	[p<0.001]	

Table 4: Surfactant Risk Mitigation Administration No surfactant will be administered.

Risk mitigation	Surfactant Management	Non Surfactant Administration
Mortality	67%	
Oxygen Requirement	29%	
Need for Mechanical Ventilation	56%	
Length of Hospital Stay	34%	
Pneumothorax	33%	

Table 5: Population Surfactant Administration Characteristics No surfactant will be administered.

Characteristics of the Population	Surfactant Management	Non Surfactant Administration
1.Age (days)	[2.2±1.6]	[2.7±1.9]
2.Gender (M/F)	[55/45]	[54/46]
3.Birth Weight (kg)	[2.7 ± 0.5]	[2.8 ± 0.6]
4.Gestational Age (weeks)	[37.3 ± 2.3]	[37.9 ± 2.7]

DISCUSSION

The current research shows that giving surfactants to newborns with MAS may enhance their prognosis. Compared to the non-surfactant group, the mortality rate in the surfactant group was much lower [03%] vs. [10%]. This result is consistent with other research demonstrating that surfactant therapy may lower mortality in infants with MAS.7,8,9. Additionally, the surfactant group had a much shorter hospital stay and required less oxygen and mechanical ventilation10,11. These results imply that surfactant administration may lessen the requirement for supportive care and shorten hospital stays in infants with MAS, thereby improving their prognosis12.The research also discovered that the administration of surfactants was linked to a decreased incidence of pneumothorax [10%] vs. [15%]13,14. A dangerous consequence of MAS called pneumothorax may cause respiratory failure and death. The reduced prevalence of pneumothorax in the surfactant group raises the possibility that the use of surfactants may lessen the danger of this potentially fatal complication15.

Limitations: There are a few restrictions on this research. First, there is selection bias present in this prospective research. Second, the generalizability of the results was constrained by the small sample size (n=100). Third, the research did not account for variables that could have an impact on the outcome measures, such as gestational age, birth weight, and gestational age at surfactant administration. Last but not least, the research did not evaluate long-term effects, such as neurodevelopmental effects.

CONCLUSION

The findings of this research imply that using a surfactant might lessen the mortality and morbidity linked to MAS in newborns. This result is in line with other research that showed the effectiveness of surfactant treatment in MAS. To validate the efficiency of surfactant administration in MAS, further research is required.

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