



SURFACTANT THERAPY IN MECONIUM ASPIRATION SYNDROME AND ITS OUTCOME IN TERTIARY CARE HOSPITAL

Dr. N. Madhavi*	Professor of Paediatrics *Corresponding Author
Dr. G. Ratnakumari	Associate Professor
Dr. A. Swamy Naidu	Professor of Paediatrics
Dr. S. Narayanarao	Assistant Professor
Dr. Taru. Prasanthi	Post Graduate
Dr. C. Harini	Post Graduate
Dr. J. Sai Sanjana	Post Graduate

ABSTRACT

Aims: To study the role of surfactant therapy in meconium aspiration syndrome and its outcome in tertiary care hospital. **Objectives:** To evaluate the efficacy of surfactant in the treatment of term and near term infants with meconium aspiration syndrome and their outcome in terms of duration and outcome of ventilation, duration of oxygen requirement, complications associated with meconium aspiration syndrome. **Material and methods:** 64 neonates admitted in NICU, King George Hospital, Visakhapatnam with symptoms of MAS were enrolled in the study, of them 32 were given surfactant and were taken as cases, 32 were not given surfactant and enrolled as controls. Data on APGAR, need for resuscitation, baby weight, gestational age and laboratory profile were recorded. Those babies with downe's score >7 were given high dose (4ml/kg) of surfactant and were followed up. **Results:** There was a rapid fall in oxygenation index in 24hrs after administration of surfactant and improvement in PaO₂/PAO₂. In surfactant group mean duration of ventilation, oxygen supplementation after extubation and length of hospital stay were all significantly low as compared to control groups. **Conclusion:** Surfactant administration improved PaO₂/PAO₂ significantly in comparison to the control group within 24 hours after delivery, indicating that surfactant aids in improving gaseous exchange at the alveolar capillary barrier in lungs.

KEYWORDS : meconium aspiration, respiratory distress, surfactant therapy.

INTRODUCTION

Meconium stained amniotic fluid is found in 10–15 percent of births, and it is more common in term and post-term babies. MAS develops in five percent of these infants; thirty percent require ventilator support, and three to five percent die. Fetal distress and hypoxia induces passage of meconium in-utero, hence meconium stained amniotic fluid indicates the need for preparedness for resuscitation in view of asphyxiated baby (1). The criteria for MAS includes any two of the following three:

- (i) Meconium staining of liquor, nails, umbilical cord and skin.
- (ii) Respiratory distress shortly after birth, usually within an hour.
- (iii) Aspiration pneumonitis (atelectasis) and radiological evidence (2).

Surfactant becomes inactive when it comes into contact with the proteins and fatty acids found in the meconium. Surfactant inactivation is linked to the consistency of the meconium as well as the concentration of the surfactant. Surfactant synthesis may be lowered as well, resulting in a secondary surfactant shortage. This causes atelectasis, poor lung compliance, intrapulmonary shunting, and hypoventilation. Secondary surfactant deficiency or dysfunction is one of the main contributing factors for respiratory failure in meconium aspiration syndrome (MAS). High dose (4ml/kg) of exogenous surfactant in babies with MAS can improve oxygenation, correct persistent pulmonary hypertension, reduce air leaks, the duration of mechanical ventilation and the need for extracorporeal membrane oxygenation (3).

MATERIALS AND METHODS:

This is a hospital based observational study done between Jan 2021 to July 2022 64 neonates admitted in NICU, King George Hospital, Visakhapatnam with symptoms of MAS were enrolled in the study, of them 32 were given surfactant and were taken as cases, 32 were not given surfactant and

enrolled as controls. This study was approved by institutional ethics committee.

Data on APGAR, need for resuscitation, baby weight, gestational age and laboratory profile were recorded. Those babies with downe's score >7 were given high dose (4ml/kg) of surfactant and were followed up. The data was collected in a predesigned proforma.

RESULTS:

64 cases (39 males , 25 females) of MAS were enrolled in the study, 32 were cases and 32 were controls. The characters of study population are shown in Table 1

TABLE 1: Characters of study population:

		Cases	Controls	P value	
1	Mean GA	39.68+ 1.55	39.34+ 1.61	0.389	
2	Mean birth weight	2.90+ 0.33	2.88+ 0.28	0.804	
3	Mode of delivery	Vaginal	31.250000%	46.880000%	0.2
		LSCS	68.750000%	53.130000%	0.2
4	Mean APGAR	1 min	6.15+ 0.36	6.25+ 0.43	0.359
		5 min	8.46+ 0.50	8.56+ 0.50	0.46
5	Mean downe's score at admission	8.5+ 0.98	8.59+ 0.94	0.698	
6	Mortality	9.380000%	15.630000%	0.449	

The mean gestational age of cases was 39.68 +/- 1.55 weeks and that of controls was 39.34 +/- 1.61. The mean birth weight of cases was 2.9 +/- 0.33 and that of controls was 2.88 +/- 0.28. 22 cases and 17 controls were delivered by LSCS, remaining were delivered vaginally. Mean 1 minute APGAR of cases and controls was 6.15 and 6.25 respectively. Mean 5 minute APGAR of cases and controls was 8.46 and 8.56 respectively.

The mean downe's score of both cases and controls at admission was 8.5.

Surfactant (4 ml/kg) was given to cases and the mean age at surfactant administration was 13.67 hours (4.6 to 23 hours) . Comparison of various parameters in cases and controls is shown in table 2.

TABLE 2 Various parameters in cases and controls:

			Cases	Controls	P value
1	Mean oxygenation index	At admission	13.94+ 6.61	15.71+ 6.77	0.296
		At 24 hrs	15.71+ 6.77	9.76+ 5.10	0.008
2	Mean Pao2/PAo2	At admission	0.13+ 0.08	0.11+ 0.03	0.1
		At 24 hrs	0.29+ 0.13	0.20+ 0.11	0.005
3	Mean duration of o2 therapy		3+ 1.56	4.71+ 2.12	0.0004
4	Mean duration of ventilation		2.87+ 1.25	6.18+ 4.35	0.0001
5	Mean duration of hospital stay		6.56+ 2.46	11.3+ 5.73	<0.001

The mean oxygenation index at admission of cases and controls was 13.94+/- 6.61 and 15.71+/- 6.77 respectively. The mean oxygenation index at 24 hours of cases and controls was 6.13+/- 5.49 and 9.76 +/- 5.1 respectively, this difference was statistically significant with p value of 0.008.

Mean pao2 /pAo2 of cases and controls at admission was 0.137+/- 0.08 and 0.110 +/- 0.03 respectively, this difference is statistically not significant. Mean pao2/ pAo2 of cases and controls at 24 hours was 0.296+/-0.13 and 0.209 +/- 0.11 respectively, this difference is statistically significant with p value of 0.005.

The mean duration of ventilation of cases and controls was 2.8 +/- 1.2 and 6.18 +/- 4.3 respectively . The difference is statistically significant with a p value of 0.0001. The mean duration of oxygen therapy of cases and controls was 3 +/- 1.5 and 4.7 +/- 2.12 respectively, the difference is statistically significant with p value of 0.0004. Hospital stay of cases and controls was 6.5 +/- 2.4 and 11.3 +/-5.7 respectively, the difference is statistically significant with p value of 0.001.

DISCUSSION:

The efficacy of exogenous surfactant given as bolus therapy for secondary surfactant deficiency and inactivation, which is one of the primary pathophysiological mechanisms underlying MAS, is the subject of this investigation.

In the present study there is no statistically significant difference in the mean GA, mean birth weight, mean APGAR at 1 minute and 5 minutes and mean downe's score among case and controls.

In the present study there is a reduction in oxygenation index and improvement in Pao2/PAo2, 24hrs after giving surfactant in cases compared to control population. The mean duration of oxygen therapy, mechanical ventilation and hospital stay were less in surfactant group compared to control group, but there is no statistically significant difference in mortality among cases and controls.

Systematic review by CK.Natarajan et al also showed that there is no reduction in mortality or reduction in duration of

oxygen therapy after giving surfactant in MAS, but the duration of MV was reduced(4).

One Cochrane review(5) which included 4 studies reported that the risk of mortality and air leaks was comparable in surfactant group and control group. In the Cochrane review there is no significant difference in duration of MV and hospital stay among two groups.

In A I El Shahed et al. Cochrane Database Syst Rev. 2007, surfactant in MAS cases did not show statistically significant reduction in mortality, duration of assisted ventilation or duration of supplemental oxygen, but there is significant reduction in length of hospital stay(6).

The study done by R D Findlay et al. paediatrics. 1996 Jan, showed significant reduction in oxygenation index and improvement in mean Pao2/PAo2, after giving surfactant in MAS cases(7).

Chinese Collaborative Study Group for Neonatal Respiratory Diseases, showed significant improvement of Pao2/PAo2 and reduction in oxygenation index following surfactant administration, but no difference was found in mean duration of MV or mortality(8).

CONCLUSIONS:

The present study shows that high dose surfactant therapy in MAS cases improved the Pao2/PAo2, reduced the oxygenation index, duration of oxygen therapy, duration of MV and duration of hospital stay. But there is no significant difference in reduction in the mortality.

The cost of high dose surfactant should be balanced against the benefits of reduction in the duration of MV and duration of hospital stay in resource limited settings.

REFERENCES:

1. Kliegman: Nelson Textbook of Pediatrics, 18th ed. 742-743
2. National Neonatology Forum 2005.
3. Klingner MC, Kruse J. Meconium aspiration syndrome: pathophysiology and prevention. J Am Board Fam Pract 1999;12(6):450-66. Advances with Surfactant 927
4. Surfactant therapy and antibiotics in neonates with meconium aspiration syndrome: a systematic review and meta-analysis CK Natarajan, MJ Sankar, K Jain, R Agarwal and VK Paul
5. Hahn S, Choi HJ, Soll R, Dargaville PA. Lung lavage for meconium aspiration syndrome in newborn infants. Cochrane Database Syst Rev 2013.
6. A I El Shahed et al. Cochrane Database Syst Rev. 2007. Surfactant for meconium aspiration syndrome in full term/near term infants.
7. Surfactant replacement therapy for meconium aspiration syndrome R D Findlay et al. Pediatrics. 1996 Jan
8. Treatment of severe meconium aspiration syndrome with porcine surfactant: a multicentre, randomized, controlled trial Chinese Collaborative Study Group for Neonatal Respiratory Diseases. Acta Paediatr. 2005 Jul.