Research Paper Medical Science

Role of Surfactant In Meconium Aspiration Syndrome In A Rural Area.

Dr. M.J. Khan	Associate professor, Department of Paediatrics, GMC, Chandrapur.
Dr. Pallavi Todase	Assistant professor, Department of Paediatrics, GMC, Chandrapur.
Dr.Bhalchandra Falke	Department of Paediatrics, GMC, Chandrapur.
Dr. Sohel Khan	Assistant professor in the department of orthopedics, JNMC ,Sawangi (wardha)
Dr. Pranay Gandhi	Assistant professor, Department of Community medicine, GMC, Chandrapur.

ABSTRACT

Background: Meconium Aspiration Syndrome is an important cause of morbidity and mortality in newborns.

Aim: To study the role of surfactant in cases of MAS.

Methodology: A non blinded clinical trial was performed on 30 patients of MAS admitted in a peripheral hospital. 15 were chosen as the cases and rest 15 were taken as the controls.

Results: Out of the 15 babies who were given the surfactant, 5 babies (33%) were given natural surfactant and 10 babies (66%) were given synthetic one. 3 babies died in each group. 10 babies required ventilatory support among the cases and 14 required it among the controls. Pulmonary hemorrhage was found in 2 babies in the cases and among 3 in the controls. The difference was not statistically significant.

Conclusion: Surfactant therapy does not decrease the mortality or the other complications in cases of MAS.

KEYWORDS : Meconium Aspiration Syndrome, Surfactant

Introduction: Meconium aspiration syndrome is one of the leading causes of morbidity and mortality in neonates[1,2,3]. In MAS there is significant disturbance in the surfactant production and activity. Many studies show that inhibition of surfactant activity is an important part of the pathophysiology of MAS. Either meconium itself or plasma proteins, haemoglobin and edema fluid may decrease the activity of surfactant, and hence exogenous administration of surfactant may be helpful. Surfactant replacement therapy is an established modality of treatment in babies born preterm with respiratory distress syndrome. Many other neonatal lung disorders have decreased surfactant as a part of pathophysiology like MAS, Shock lung, pulmonary hemorrhage, pneumonia, Congenital Diaphragmatic Hernia, Bronchopulmonary Dysplasia. Insufficient or absent surfactant in MAS can be increased by supplementation. This study aims to examine the effects of exogenous surfactant administration in cases of MAS at a centre in rural area.

Aims and Objectives: To evaluate the effect of surfactant administration in treatment of late preterm and term infants born with Meconium Aspiration Syndrome.

Materials and Methods:
A nonblinded clinical trial was performed over a period of 1 year from January 2015 to December 2015 in a hospital in rural area. A total of 30 neonates were recruited in the study.

In patients in whom the parents agreed for surfactant, either Survanta at 4 ml/kg (150 mg/kg) or Neosurf at 5 ml/kg (135 mg/kg) were given,depending on the financial capability of parents. Intratracheal bolus administration of surfactant versus no or placebo therapy was given. Lavage method was not used. Also the number of babies who were not given surfactant was kept at 15 as apposed to the ones who were given surfactant for easier calculation. Timing of administration of surfactant was noted as early rescue and late rescue therapy. Early rescue implied to administration of surfactant within 2 hours of birth and late rescue as administration after 2 hours of birth. Also , vitals like respiratory rate and saturation were monitored periodically. Routine neonatal care was provided to every child. Repeat doses were given to babies requiring FiO2 of more than 35% and mean airway pressure of more than 7 cm H2O to maintain a PO2 of 50-70 mmHg[9]. During the course of NICU stay, babies were monitored for complications like air leak, pulmonary haemorrhage. Duration of hospital stay, duration of ventilation, duration of supplemental oxygen were also recorded. Babies were deemed fit for discharge when they had no respiratory distress, saturations were maintained and they were feeding well.

Inclusion Criteria:
1. Late preterm (born within 34-36 weeks of gestation) and term babies born by either normal vaginal delivery or Caeserian Section.
2. Babies with evidence of meconium stained amniotic fluid during any stage of labour

Exclusion Criteria:
1. Babies born with Meconium stained amniotic fluid but born less than 34 weeks of gestation were excluded.
2. Babies with conditions other than MAS like Congenital Heart Disease,Congenital Malformation of any sort were excluded.
3. Parents with financial constraint who did not give consent for the study.

Outcome:
Outcomes were mainly divided into primary and secondary as,
1 Primary outcome :
Mortality
2 Secondary outcome:
Showing Pulmonary haemorrhage
Requiring mechanical ventilation

Result :
The total number of babies who were given surfactant were 15 versus 15 babies in the control group with MAS. Out of these 15 babies,5 babies (33%) were given natural surfactant (Survanta) and 10 babies

(66%) were given synthetic one (Neosurf).

(figure 1 comes here)
In the surfactant group,4 babies were between 2 to 2.5 kgs, 6 were between 2.5-3 kgs and 5 babies were more than 3 kgs. In the control group,2 babies were in between 2-2.5 kgs,9 babies were in between 2.5-3 kgs,and 4 babies were more than 3 kg birth weight. In the babies from the surfactant group,division of babies on the basis of gestational age was noted as 2 babies in the late preterm group and 13 babies in the term group,while in the control group,5 babies were late preterm and 10 babies were of term gestational age. In the surfactant group,9 babies were admitted in less than 2 hours of life to our NICU,3 babies in between 2 to 4 hours and 3 babies between 4 to 24 hours. In the control group,8 babies were admitted in less than 2 hours,2 babies in between 2 to 4 hours and 5 babies between 4 to 24 hours of life.

(table 1 comes here)
Method of administration of surfactant was ET+CPAP in 6 babies,ET+Venti in 6 babies and ET+InSurE were 3 babies. A total of 5 babies needed repeat dose of surfactant.In the first group,1 baby needed repeat dose of natural surfactant whereas 4 babies needed repeat dose of synthetic one. In the surfactant group,early rescue was given to 3 babies and remaining 12 babies were given late rescue.

Newborns needing ventilator support were 10 out of 15 in the surfactant group,and 14 out of 15 in the control group. In spite of ventilatory support,3 babies each in the surfactant group and the control group died. Pulmonary haemorrhage was seen in 2 out 3 babies who died in the surfactant group,as opposed to 3 out of 3 babies in the control group.

(table 2 comes here)

Discussion:

Meconium stained amniotic fluid complicates around 8-25% of live births. Most cases occur in babies born term or post term. Approximately 5% of babies with meconium stained amniotic fluid develop meconium aspiration syndrome and approximately 50% of them require mechanical ventilation. [8]

In respiratory disorders with surfactant deficiency, exogenous administration of surfactant helps in decreasing the morbidity associated. It is administered through the endotracheal tube using standard preparation.

In our study we gave exogenous surfactant to 15 babies of MAS whose parents could afford the surfactant. Newborns needing ventilator support were 10 out of 15 in the surfactant group,and 14 out of 15 in the control group. In spite of ventilatory support,3 babies each in the surfactant group and the control group died. Pulmonary haemorrhage was seen in 2 out 3 babies who died in the surfactant group,as opposed to 3 out of 3 babies in the control group.

Many studies have been published to review the effects of surfactant in MAS. Halliday *et al*[4] in 1996 published study on the use of surfactant in MAS. In this study, 54 newborns with MAS were given surfactant at a median age of 14 years. In this study, 18% babies had improved gas exchange, 44% did not show any response ,but only 2 babies required ECMO. Another study done by Findlay *et al* [5] in 1996, demonstrated effects of surfactant in 40 babies with MAS. In this study, slightly higher dose of 150ml/kg was used. This study concluded that early administration of surfactant was helpful in MAS. Auten *et al* [6]in 1991, demonstrated short term benefits like decrease in hospital stay and decrease in assisted mechanical duration after surfactant use in MAS. Also, Khammash *et al* [7]also reported similar results after surfactant use. Dargaville *et al* [2] also had similar findings with use of surfactant in MAS.

Conclusion: Surfactant therapy does not decrease the mortality or the other complications in cases of MAS.

Limitation of study:
Number of babies recruited for the study is less.
No blinding was done in the trial
Financial constraint was an important factor in deciding the mode of treatment.

Figure 1: Showing the number of babies of Meconium aspiration syndrome given surfactant.

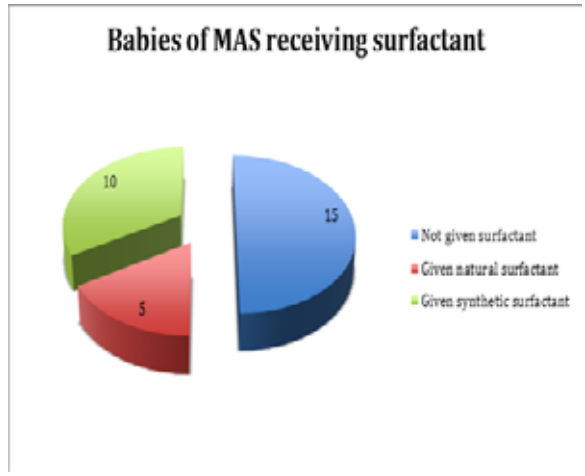

Table 1: Characteristics of babies of MAS in the study.

Characteristic	Surfactant given (n=15)	Control (n=15)
1. Birth weight 2-2.5kg 2.5-3kgs >3 kgs	 4 (26%) 6 (40%) 5 (33%)	 2 (13%)* 9 (60%)* 4 (26%)*
2. Gestational age Late preterm Term	 2 (13%) 13(86%)	 5(33%)* 10 (66%)*
3. Time of admission in NICU < 2 hours 2-4 hours 4 – 24 hours	 9(60%) 3 (20%) 3 (20%)	 8 (53%)* 2 (13%)* 5 (33%)*

*Applying Fisher exact test p value > 0.5 i.e. not significant i.e. the groups are comparable.

Table 2: Outcome in babies of MAS between cases and controls.

Outcome	Surfactant given (n=15) (%)	Control (n=15) (%)
1. Babies died	3 (20%)	3 (20%)*
2.Babies requiring ventilatory support	10 (66%)	14 (93%)*
3.Pulomonary hemorrhage seen in babies	2 (13%)	3 (20%)*

*Applying Fisher exact test p value > 0.5 i.e. not significant.

References:

1. Fleischer A, Anyaegbunam A, Guidetti D,Randolph G, Merkatz IR: A persistent clinical problem: profile of the term infant with significant respiratory complications. Obstet Gynecol 1992; 79: 185–190.
2. Dargaville PA, Copnell B: The epidemiology of meconium aspiration syndrome: incidence, risk factors, therapies, and outcome.Pediatrics 2006; 117: 1712–1721.
3. The Neonatal Inhaled Nitric Oxide Study Group: Inhaled nitric oxide in full-term and nearly full-term infants with hypoxic respiratory failure. N Engl J Med 1997; 336: 597–604.
4. Halliday HL, Speer CP, Robertson B. Treatment of severe meconium aspiration syndrome with porcine surfactant. Eur J Pediatr 1996;155(12):1047-1051.
5. Findlay RD, Tauesch HW, Walther FJ. Surfactant replacement therapy for meconium aspiration syndrome. Pediatrics 1996;97(1):48-52.
6. Auten RL, Notter RH, Kendig JW, Davis JM, Shapiro DL. Surfactant treatment of full-term newborns with respiratory failure. Pediatrics 1991;87(1):101-107.
7. Khammash H, Perlman M, Wojtulewicz, Dunn M. Surfactant therapy in full-term neonates with severe respiratory failure. Pediatrics 1993;92(1):135-139.
8. Meconium aspiration.chapter 35.Manual of Neonatal Care,7th edition,Cloherty.
9. Katz LA, Klein JM. Repeat surfactant therapy for postsurfactant slump.J Perinatol. 2006 Jul;26(7):414-22. Epub 2006 May 18.PMID:16724122