Avery and Mead in 1959, commented on the deficiency of a surface active material in the alveolar linings of the lungs of preterm babies with Respiratory Distress Syndrome (RDS). This surface active material was later termed as Surfactant, which is a type of in vivo produced, foamy, fatty liquid that prevents the alveolar sacs from completely collapsing at the end of expiration, thereby reducing the initial momentum required for next inspiratory breath and hence work of breathing. Surfactant usually starts making its appearance in the fetus lung at about 24 weeks of gestation and thereafter gradually increases to its full extent by term gestation i.e. 37 weeks.

Exogenous surfactant therapy has become a major and safe treatment modality in newborn infants with respiratory distress syndrome. RDS is defined by the presence of acute onset of respiratory distress with ineffective gas exchange in a preterm baby with a typical clinical course or X-ray features such as ground glass appearance, air bronchograms and reduced lung volumes.

Surfactant replacement therapy, either as a rescue treatment or as a prophylactic treatment, has been shown to reduce mortality and several aspects of morbidity in infants with RDS like decreased oxygenation, incidence of pneumothorax and pulmonary interstitial emphysema and duration of ventilatory support. It also improves the likelihood of survival of preterms without Chronic Lung Disease of the preterms, largely by improving survival. This increase in survival is commensurate with no increase in adverse neurodevelopment outcome.

There are certain consensus recommendations regarding the use of exogenous surfactant in the treatment of various neonatal respiratory disorders which are as under-

1. Intubated babies with RDS should receive exogenous surfactant therapy as it demonstrates a decrease in the need for extra corporeal membrane oxygenation.
2. Intubated newborns with Meconium Aspiration Syndrome requiring more than 50% oxygen should receive exogenous surfactant therapy.
3. Sick newborns with pneumonia and an oxygenation index greater than 15 should receive exogenous surfactant therapy.
4. Infants who are at a significant risk of RDS should receive prophylactic natural surfactant therapy as soon as they are stable within a few minutes after intubation as the incidence of RDS, pneumothorax and pulmonary interstitial emphysema were all decreased, although there was no difference in the incidence of Chronic lung disease of the preterms in babies treated prophylactically versus babies who received rescue surfactant therapy. No differences were noted in the incidence of PDA/ NEC/ ROP/ IVH among both groups.
5. Less approved recommendation for use of exogenous surfactant therapy includes intubated newborn infants with pulmonary haemorrhage which leads to clinical deterioration.
6. Finally, for lung hypoplasia and congenital diaphragmatic hernia for which only small case series have been reported and no conclusions can be made.

There are certain short term risks associated with the usage of surfactant therapy which include bradycardia and hypoxemia during instillation as well as blockage of endotracheal tube. There may also be an increase in pulmonary haemorrhage following surfactant therapy.

Regarding method of administration, usually in the clinical setting, surfactant is administered in liquid form via the endotracheal tube by placing the infant in multiple different positions, although there is no evidence to support this practice of administering surfactant in multiple positions of baby. The dosage of surfactant varies from 25 mg to 200 mg phospholipid per kg body weight as single dose depending on the source of surfactant and the clinical indication. Broadly speaking, lower doses would be appropriate for prophylaxis while higher doses might be required for rescue treatment of established RDS.
Infants with respiratory distress syndrome who have persistent or recurrent oxygen and ventilatory requirement of 30% or more in the first 72 hours of life should have multiple doses of surfactant. Administering more than 3 doses has not been found to be beneficial. Repeat dose of surfactant may be given as early as 2 hours after the initial dose, or more commonly, 4 hours to 6 hours after the initial dose. Options to be considered for ventilatory management after prophylactic surfactant therapy include very rapid weaning and extubation to CPAP within one hour.

REFERENCES: