IV. IMMATURITY OF THE LUNGS: NEONATAL PERSPECTIVE -POSTNATAL CARE OF THE IMMATURE LUNG. SURFACTANT THERAPY.

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Postnatal care of the immature lung. There are two principal goals in postnatal care of immature lung: 1) to replace an endogenous surfactant deficit; 2) to maintain adequate ventilation (effective lung recruitment) with minimal damage of the immature lung.

Surfactant therapy. Surfactant therapy, either with synthetic or natural surfactant, is clearly proven to be effective in altering the early course of RDS, in decreasing the requirement for supplemental oxygen or assisted ventilation. Significant clinical benefit is demonstrated by the decrease in pneumothorax, bronchopulmonary dysplasia or death at 28 days, and mortality. Despite an undoubted benefit of the surfactant many questions regarding surfactant treatment remain unanswered. The studies which compare prophylactic administration to rescue treatment of the premature baby do not give definitive answers regarding approach of treatment. Prophylactic surfactant replacement has potential theoretical advantages, i.e. facilitation of initial lung aeration, better initial distribution of the surfactant, decreased alveolar-capillary leakage of serum proteins, decreased barotrauma, and etc. On the other hand, routine prophylaxis of all preterm babies with gestational age 32 or even 28 weeks could constitute a significant overtreatment, i.e. unnecessary intubation of some babies, unnecessary exposure to possible adverse effect of exogenous surfactant, unfounded expenses of treatment. The results from clinical trials which specifically compare single to multiple-dose therapy suggest that multiple dose may be more effective. However, the initial dose, the need for repeat treatment, and timing of subsequent doses remain unclear. The initial dose of surfactant ranges from 50 to 200 mg/kg. Few side effects, i.e. an increase incidence of PDA and pulmonary hemorrhage have been reported. Data from recent multicenter trials of surfactant treatment indicate that infants receiving prenatal steroids had better response to surfactant with regard to overall mortality, respiratory mortality, air leaks, PDA, and intraventricular hemorrhage. These findings emphasize that surfactant replacement should not be considered as an alternative treatment to prenatal corticosteroids.

V. IMMATURITY OF THE LUNGS: NEONATAL PERSPECTIVE – MAINTENANCE OF ADEQUATE VENTILATION

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Maintenance of adequate ventilation. Nasal CPAP (Continuous Positive Airway Pressure) therapy in infants with RDS improves oxygenation, decreases oxygen requirements, reduces the need of intubation, mechanical lung ventilation, and mortality. Earlier application of the CPAP therapy is beneficial. Combination of early surfactant administration with CPAP therapy seems a promising approach to treatment of the tiny baby. Conventional mechanical ventilation remains the principal mode for maintenance of adequate lung ventilation. Despite of the number of disadvantages the mechanical ventilation definitely reduces the death rate of babies with severe RDS. More than that, introduction of a new modes of conventional mechanical ventilation, especially those related with patient-initiated breathing (patient-triggered, synchronized intermittent mandatory, assist control, proportional assisted ventilation) considerably decreased a possibility of lung's barotrauma and development of BPD. Although HFO (High Frequency Oscillation) has some theoretical advantages comparing with conventional mechanical ventilation but the meta-analysis of the controlled clinical studies does not confirm better results of survival or BPD in newborn babies with RDS. More randomized clinical trials have to be done to proof advantages of HFO before this method of ventilation will be recommended for routine use. A promising results are published about combine use of different methods of treatment: surfactant + HFO, HFO + perfluorochemicals, HFO + NO (nitric oxide), and etc.

How best to achieve adequate gas exchange without further inducing lung injury remains the goal of clinicians and researches alike.