

Respiratory Distress Syndrome in Preterm Neonates: Causes, Symptoms, Diagnosis and Management

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Introduction

Respiratory Distress Syndrome (RDS) is a common condition that affects preterm neonates, also known as premature babies. Preterm neonates are babies who are born before 37 weeks of gestation. RDS is characterized by difficulty in breathing and a lack of oxygen in the body due to underdeveloped lungs. It is caused by a lack of surfactant, a substance that helps keep the lungs inflated by reducing surface tension. Surfactant is produced by the lungs and is normally present in sufficient quantities by 34 weeks of gestation. RDS is more common in babies born before 28 weeks of gestation, but can also affect babies born between 28 and 34 weeks of gestation. The severity of RDS varies depending on the gestational age of the baby and the amount of surfactant present in the lungs. Babies with severe RDS may require mechanical ventilation and other supportive measures to help them breathe. The incidence of RDS can be reduced by administering antenatal corticosteroids to mothers at risk of preterm delivery, which helps stimulate the production of surfactant in the baby's lungs. Other preventative measures include delaying delivery when possible and providing exogenous surfactant to preterm neonates with RDS [1-4].

Description

RDS can have significant short-term and long-term consequences for preterm neonates, including an increased risk of respiratory failure, pneumonia and bronchopulmonary dysplasia. Therefore, prompt recognition and treatment of RDS are essential for improving outcomes for preterm neonates. Preterm neonates, defined as babies born before 37 weeks of gestation, are at high risk of developing respiratory distress syndrome (RDS) due to immature lung development. RDS is a common and serious condition that affects the lungs of premature babies and can be life-threatening if not treated promptly and effectively. In this article, we will discuss the causes, symptoms, diagnosis and management of RDS in preterm neonates [5].

Causes

RDS occurs when the lungs of premature babies are not fully developed, specifically the surfactant-producing cells called type II pneumocytes. Surfactant is a substance that coats the inside of the lungs and prevents the alveoli (air sacs) from collapsing during exhalation, which is necessary for proper oxygen exchange. Without enough surfactant, the alveoli can collapse and cause difficulty breathing, leading to RDS.

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Other risk factors for developing RDS include:

- Premature birth before 34 weeks
- Low birth weight
- Maternal diabetes
- Cesarean delivery without labor
- Male gender
- Symptoms

The symptoms of RDS usually appear shortly after birth, within hours or days. They may include:

- Rapid breathing (more than 60 breaths per minute)
- Shallow breathing
- Grunting sounds during breathing
- Flaring nostrils
- Retractions (when the skin between the ribs or under the ribcage is pulled in during breathing)
- Cyanosis (bluish color of the skin due to lack of oxygen)
- Lethargy or decreased activity
- Poor feeding

Diagnosis

The diagnosis of RDS is usually made based on the clinical presentation and physical examination of the newborn, along with other tests, including:

- **Chest X-ray:** shows the characteristic findings of RDS, such as a ground-glass appearance of the lungs, air bronchograms (when the airways are visible due to collapsed alveoli) and a small heart shadow (due to the underinflated lungs pushing the heart upward).
- **Blood gas analysis:** measures the levels of oxygen and carbon dioxide in the blood, which can help determine the severity of RDS and guide treatment.
- **Pulse oximetry:** a non-invasive test that measures the oxygen saturation level in the blood, which can be used to monitor the baby's response to treatment.

Management

The management of RDS in preterm neonates includes supportive care, respiratory support and surfactant replacement therapy.

Supportive care includes:

- **Keeping the baby warm:** premature babies are at high risk of hypothermia, which can worsen RDS, so they need to be kept in a warm environment, such as an incubator or radiant warmer.
- **Providing adequate nutrition:** premature babies often have difficulty feeding due to their immature gastrointestinal system, so they may need to receive nutrition through an intravenous (IV) line or a feeding tube.

Respiratory support includes:

- **Supplemental oxygen:** preterm neonates with RDS may need extra oxygen to help them breathe and maintain adequate oxygen levels in the blood.
- **Continuous positive airway pressure (CPAP):** a non-invasive form of respiratory support that provides a constant flow of air and pressure to keep the airways open and improve breathing.
- **Mechanical ventilation:** if the baby's condition worsens or does not improve with CPAP, mechanical ventilation may be necessary, which involves the use of a machine to deliver breaths of air to the baby's lungs through a tube inserted into the windpipe.

Surfactant replacement therapy is a treatment that involves administering exogenous surfactant directly into the baby's lungs to improve breathing and prevent complications. There are currently several types of surfactant available, including natural animal-derived surfactant and synthetic.

Conclusion

Respiratory Distress Syndrome (RDS) is a serious respiratory condition that affects premature babies, particularly those born before 34 weeks of gestation. The condition results from a deficiency of surfactant, which is essential for proper lung function. Without enough surfactant, the lungs become stiff and difficult to inflate, leading to breathing difficulties. Treatment for RDS typically involves providing supplemental oxygen and administering exogenous surfactant to help the infant breathe more easily. Other supportive therapies may be necessary, including mechanical ventilation and continuous positive airway pressure (CPAP). In severe cases, the infant may need to be transferred to a neonatal intensive care unit (NICU) for further treatment.

Acknowledgement

None.

Conflict of Interest

Neither author has any conflicts of interest to declare.

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