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Bronchopulmonary Dysplasia (BPD): A Chronic Lung Disease in Infants

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Introduction

Bronchopulmonary dysplasia (BPD) is a chronic lung disease that primarily affects premature infants who require prolonged respiratory support after birth. First described in the late 1960s, BPD remains one of the most significant complications of prematurity despite advances in neonatal intensive care. It is characterized by impaired lung development, inflammation, and scarring, which result from both the immaturity of the lungs and the effects of interventions such as mechanical ventilation and supplemental oxygen. BPD can lead to long-term respiratory and developmental challenges, making early recognition and comprehensive management crucial [1,2].

Discussion

The main risk factor for BPD is premature birth, particularly before 28 weeks of gestation, when the lungs are structurally and functionally immature. Low birth weight, intrauterine growth restriction, infections, and prolonged oxygen therapy also increase the risk. Mechanical ventilation, while lifesaving, can cause trauma to delicate lung tissue, while high oxygen concentrations may generate free radicals that damage cells. Together, these factors contribute to abnormal lung growth, chronic inflammation, and fibrosis [3,4].

Clinically, BPD is diagnosed when an infant continues to require supplemental oxygen or respiratory support beyond 28 days of life, often extending to 36 weeks postmenstrual age. Symptoms may include rapid breathing, wheezing, retractions of the chest wall, and difficulty feeding due to respiratory distress. In more severe cases, infants may experience frequent lung infections, poor growth, and reduced exercise tolerance as they grow older [5,6].

Diagnosis of BPD relies on a combination of clinical history, physical examination, and imaging studies. Chest X-rays may show signs such as overinflated lungs, fibrosis, or areas of atelectasis (collapsed lung tissue). The severity of BPD is usually classified as mild, moderate, or severe, depending on the level of oxygen and ventilatory support required at a specific age [7,8].

Management of BPD is multifaceted, focusing on both respiratory support and overall growth. Non-invasive ventilation techniques and careful adjustment of oxygen levels aim to minimize further lung injury. Medications such as bronchodilators, diuretics, and corticosteroids may be used to improve lung function and reduce inflammation. Nutrition plays a vital role, as infants with BPD have higher energy needs due to increased work of breathing; therefore, adequate caloric and protein intake is essential to support growth and lung repair. Preventing and treating infections is equally important, as respiratory illnesses can worsen lung damage [9,10].

Long-term outcomes of BPD vary. Many children gradually outgrow the condition as their lungs develop, but some may experience chronic respiratory problems such as asthma-like symptoms, pulmonary hypertension, or increased vulnerability to infections. Additionally, BPD is often associated with neurodevelopmental delays due to the combined effects of prematurity and prolonged critical illness.

Conclusion

Bronchopulmonary dysplasia remains a major challenge in neonatal care, particularly among extremely premature infants. It results from a combination of lung immaturity and damage caused by life-saving interventions such as oxygen therapy and mechanical ventilation. Early recognition, careful respiratory management, optimal nutrition, and infection prevention are essential for improving outcomes. While many infants eventually recover, some face long-term respiratory and developmental challenges, underscoring the need for continued follow-up and supportive care. Ongoing research aimed at protecting fragile lungs and promoting healthy development offers hope for reducing the burden of BPD in future generations.

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