Sleep-disordered breathing and its cardiopulmonary complications: a clinical overview.

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Introduction

Sleep-Disordered Breathing (SDB) refers to a spectrum of respiratory abnormalities during sleep, the most common being Obstructive Sleep Apnea (OSA). Characterized by repetitive episodes of partial or complete upper airway obstruction, SDB disrupts normal ventilation and leads to intermittent hypoxia, sleep fragmentation, and fluctuations in intrathoracic pressure. These pathophysiological changes can have significant implications for both cardiac and pulmonary health [1, 2, 3, 4].

Cardiovascular Implications

SDB, particularly OSA, has been independently associated with a range of cardiovascular disorders. Intermittent hypoxia and arousals from sleep activate the sympathetic nervous system, elevate blood pressure, and increase heart rate variability. This contributes to the development and progression of systemic hypertension, atrial fibrillation, heart failure, and ischemic heart disease. Additionally, endothelial dysfunction and increased oxidative stress in SDB patients promote atherosclerosis, further heightening cardiovascular risk [5,6, 7].

Pulmonary Complications

SDB may exacerbate or coexist with chronic respiratory conditions such as chronic obstructive pulmonary disease (COPD) and pulmonary hypertension. The overlap syndrome—concurrent COPD and OSA—is particularly associated with increased morbidity and mortality. Moreover, repeated episodes of hypoxemia can lead to pulmonary vasoconstriction, ultimately contributing to the development of pulmonary hypertension. In severe cases, this may progress to cor pulmonale [8, 9, 10].

Clinical Significance and Management

Early diagnosis and treatment of SDB are critical to preventing long-term cardiopulmonary complications. Polysomnography remains the gold standard for diagnosis, while continuous positive airway pressure (CPAP) therapy is the mainstay of treatment. CPAP has been shown to reduce blood pressure, improve left ventricular function, and lower the risk of adverse cardiovascular events. Lifestyle modifications, weight management, and treatment of comorbidities further enhance patient outcomes.

Conclusion

Sleep-Disordered Breathing is a common yet underdiagnosed condition with far-reaching cardiopulmonary consequences. Clinicians must maintain a high index of suspicion in at-risk populations to ensure timely diagnosis and intervention. Addressing SDB not only improves sleep quality but significantly mitigates the burden of cardiovascular and pulmonary disease.

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