

MEDICAL DISORDERS AND SLEEP

Volume 2 • Number 1 • March 2007

Contents

Foreword **xi**

Teofilo Lee-Chiong Jr.

Preface **xiii**

Nancy A. Collop

Sleep in Chronic Obstructive Pulmonary Disease **1**

Vahid Mohsenin

COPD is the fourth leading cause of death in the US, affecting 14 millions adults. Symptoms related to sleep disturbances are common in individuals with moderate to severe COPD, particularly in elderly patients. One cause of morbidity in this population is abnormalities in gas exchange and resultant hypoxemia, which can lead to elevated pulmonary pressures, dyspnea, and right ventricular overload and failure. Sleep has profound adverse effects on respiration and gas exchange in patients with COPD. Smoking cessation, bronchodilation, inhaled steroids in those with a reversible component, and pulmonary rehabilitation are cornerstones of treatment. Improvement in lung mechanics and gas exchange should lead to better sleep quality and health status.

The Relationship Between Sleep and Asthma **9**

Strahil T. Atanasov and William J. Calhoun

Sleep-related asthma, also known as *nocturnal asthma*, is characterized by a decrease in forced expiratory volume in 1 second of at least 15% between bedtime and wake-up time in patients diagnosed with asthma. In some patients, these decrements in lung function can reach 50%. Nocturnal asthma seems to have significant clinical impact, and the most recent United States guidelines for asthma management emphasize that nocturnal symptoms indicate the need for more aggressive controller therapy. Several factors have been proposed to cause or worsen nocturnal bronchoconstriction, including horizontal posture in bed, airway cooling, exposure to allergens, gastroesophageal reflux, obesity, and obstructive sleep apnea. Several mechanisms of nocturnal bronchial spasm have also been proposed, including circadian fluctuations in hormone levels, circadian variations in autonomic nervous system activity, airway inflammation, and genetic predisposition.

Sleep and Glucose Intolerance/Diabetes Mellitus**19***Mary Ip and Babak Mokhlesi*

The sleep state itself has modulatory effects on glucose homeostasis. Epidemiologic and experimental studies suggest that sleep loss and sleep disturbances are detrimental to metabolic function and may predispose to obesity or glucose intolerance. Apart from the common risk factor of obesity, increasing data also support that obstructive sleep apnea exerts independent adverse effects on glucose intolerance and diabetes mellitus, although definitive evidence is still needed.

Sleep Disturbance in Fibromyalgia**31***Margaret D. Lineberger, Melanie K. Means, and Jack D. Edinger*

Fibromyalgia (FM), characterized by diffuse myalgia, multiple topographically specific tender points, chronic fatigue, psychosocial distress, and disturbed, unrefreshing sleep, is a significant health problem. Clinical survey studies suggest that the majority of FM patients present with insomnia complaints, including difficulty initiating sleep, sleep maintenance problems, or persistent nonrestorative sleep. Studies of clinical FM patients have shown that a worsening of sleep enhances subsequent daytime distress and pain complaints, whereas exacerbations of daytime pain or psychosocial distress often are followed by increased nocturnal sleep disruption. Given such findings, it seems reasonable to speculate that sleep disturbance is mechanistically important to the etiology or symptom maintenance of the FM syndrome. This article provides an overview of FM-related sleep difficulties and their treatment.

Gastroesophageal Reflux During Sleep**41***Susan M. Harding*

Esophageal acid clearance is markedly delayed during sleep and requires an arousal response for clearance. The prevalence of sleep-related gastroesophageal reflux (GER) is 79% in GER patients and approximately 25% in the Sleep Heart Health Study participants. Sleep-related GER is associated with esophagitis, Barrett's esophagus, esophageal adenocarcinoma, arousals, poor sleep quality, excessive daytime sleepiness, impaired quality of life, and extraesophageal manifestations of GER. The possible association between GER and obstructive sleep apnea is currently being investigated. Diagnosis of sleep-related GER includes careful history taking and esophageal pH testing, which can also be integrated with polysomnography. Treatment includes conservative measures, medications (primarily proton pump inhibitors, H₂ receptor antagonists, and prokinetic agents), and surgical fundoplication in selected patients.

HIV/AIDS**51***Steven Reid and Louise McGrath*

Insomnia is common in people living with HIV and AIDS. Evidence to date suggests that there is no consistent relationship between altered sleep architecture and disease progression. The exception is late-stage HIV infection associated with cognitive impairment. The antiretroviral drug efavirenz has also been found to be a contributor but the most significant risk factor is psychological morbidity. This highlights the importance of investigation and management of underlying anxiety and depression in people presenting with persistent insomnia.

Sleep Disorders and End-Stage Renal Disease 59*Patrick Hanly*

Sleep complaints and sleep disorders are common in patients with end-stage renal disease (ESRD). Patients frequently report both insomnia and excessive sleepiness, which are significant contributors to their impaired quality of life. Restless legs syndrome, periodic limb movement disorder, and sleep apnea are highly prevalent. In addition to causing sleep disruption and sleep loss, these conditions may further increase the considerable cardiovascular morbidity and mortality in this patient population. Although conventional dialysis does not correct these sleep disorders, nocturnal hemodialysis and renal transplantation may be more effective.

Sleep and Cancer 67*Edward J. Stepanski and Helen J. Burgess*

Patients with cancer commonly report disturbed sleep, fatigue, and daytime drowsiness. Although sleep disturbance contributes to significantly reduced quality of life, the overall significance of poor sleep as it relates to fatigue, pain, depression, or other health outcomes is unknown. Given that management of these symptoms is desirable for optimal outcomes in the treatment of cancer, evaluation and treatment of sleep disturbance in patients undergoing treatment for cancer is important. Given the need to minimize treatment burden, evaluation and treatment of sleep disturbance in this population may require clinical protocols specifically designed for patients with cancer. Further investigation is also needed into the role of pro-inflammatory cytokines as either a cause or consequence of sleep disturbance in this population.

Sleep, Blood Pressure Regulation, and Hypertension 77*Sean M. Caples and Virend K. Somers*

The link between sleep and the cardiovascular system is well recognized, both in health and disease. Because of the relative ease of noninvasive ambulatory measurement, no aspect of this relationship has been more studied than blood pressure (BP). The study of obstructive sleep apnea has furthered the understanding of blood pressure and its regulatory mechanisms. More recently, as the scientific and public eyes have focused on inadequate sleep as a plague of modern society, research efforts have been directed at the consequences of sleep debt on systemic disease, including blood pressure dysregulation.

Sleep and Breathing in Cystic Fibrosis 87*Amanda J. Piper, Peter T.P. Bye, and Ronald R. Grunstein*

Sleep hypoxemia, hypoventilation, and cough occur in patients with CF, especially as pulmonary disease worsens. Sleep disturbance is common, with a significant number of patients reporting their sleep quality to be poor. Changes in neurocognitive function and daytime activation may be related to sleep loss. Improvements in gas exchange have been achieved during acute physiological and short-term interventional studies with oxygen breathing, while nocturnal noninvasive ventilation has been shown to maintain ventilation in REM sleep and reduce work of breathing. However, high-quality long-term trials examining the impact of these therapies on disease progression and daytime function are lacking.

Sleep and Pulmonary Hypertension

99

Vidya Krishnan and Nancy A. Collop

Sleep-related breathing disorders and pulmonary hypertension (PH) are inextricably linked, although the mechanisms of association are complex. Physiologic changes associated with sleep-related breathing disorders, including hypoxia, hypercoagulability, and systemic inflammation, may result in alterations in pulmonary hemodynamics. While sleep-disordered breathing in and of itself may not result in severe PH, it likely results in elevated pulmonary arterial pressures. Treatment of sleep-disordered breathing appears to improve pulmonary arterial pressures. Data are needed to determine if the treatment of sleep-disordered breathing will improve clinical outcomes of patients with PH.

Special Article: Sleep-Related Breathing Disorder and Heart Disease—Central Sleep Apnea

107

Timothy A. Connolly and Amir Sharafkhaneh

This article reviews cardiovascular physiology and ventilatory control during sleep, the epidemiology of sleep-related breathing disorder (SRBD) in congestive heart failure (CHF), the pathophysiology of central sleep apnea (CSA) as it relates to CHF, and the clinical features and implications of SRBD in systolic CHF. It then focuses on treatment options for CHF-related CSA including continuous positive airway pressure and newer modalities such as adaptive pressure support servo-ventilation.

Index

119