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Review

Hypertension and Sleep Apnea

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ABSTRACT

Obstructive sleep apnea is more prevalent in patients with hypertension than in the general population and many with obstructive sleep apnea also have hypertension. Obstructive sleep apnea increases the risk of hypertension-related morbidities such as stroke, heart failure, and premature death. Are such associations coincidental or causal and if the latter, what are their implications for clinical practice? Despite compelling epidemiological and mechanistic links between obstructive sleep apnea and hypertension, the effect in clinical trials of the treatment of obstructive sleep apnea on blood pressure has been modest and variable. The purpose of this review is to summarize our present understanding of: (1) the relevant epidemiology and mechanisms that might be responsible for the bidirectional relationship between obstructive sleep apnea and hypertension; and (2) available evidence regarding the effect of treating obstructive sleep apnea on blood pressure.

RÉSUMÉ

L'apnée obstructive du sommeil est plus répandue chez les patients souffrant d'hypertension que dans la population générale. De plus, beaucoup de patients souffrant d'apnée obstructive du sommeil souffrent également d'hypertension. L'apnée obstructive du sommeil augmente le risque de maladies liées à l'hypertension telles que l'accident vasculaire cérébral, l'insuffisance cardiaque et la mort prématurée. Ces associations sont-elles fortuites ou causales? Et si elles étaient causales, quelles sont ses conséquences sur la pratique clinique? En dépit des liens épidémiologiques et mécanistiques irréfutables entre l'apnée obstructive du sommeil et l'hypertension, les essais cliniques ont démontré que l'effet du traitement de l'apnée obstructive du sommeil sur la pression artérielle était modeste et variable. Le but de cette revue est de résumer notre compréhension actuelle de : 1) l'épidémiologie et des mécanismes pertinents qui seraient responsables de la relation bidirectionnelle entre l'apnée obstructive du sommeil et l'hypertension; 2) des données probantes disponibles concernant l'effet du traitement de l'apnée obstructive du sommeil sur la pression artérielle.

Moderate or severe obstructive sleep apnea (OSA) can be detected in a third or more of patients with primary hypertension and in up to 80% of individuals with drug-resistant hypertension. Is this a coincidence or a manifestation of causal mechanisms? The intent of this brief review is to summarize: the epidemiology of OSA and its relation to blood pressure and cardiovascular risk; mechanisms by which OSA could promote the development or progression of hypertension; and the effect of treating OSA on blood pressure.

Sleep and Circadian Hemodynamic Rhythms

Blood pressure and heart rate exhibit circadian rhythms of principally neurogenic origin. During nonrapid eye movement sleep, central sympathetic outflow diminishes and cardiac vagal tone is augmented.[1-3] As a result, blood pressure and heart rate decrease by approximately 25% from average waking values and increase by a corresponding amount upon awakening.[4,5] In most patients with hypertension but without sleep-related breathing disorders, blood pressure decreases to normotensive levels during sleep.[5]

This circadian hemodynamic rhythm, with corresponding reductions in myocardial load and oxygen demand, is critical for cardiovascular health, because cardiac metabolic gene expression exhibits a similar rhythm. Diurnal variations in myocardial workload are anticipated and substrate availability is synchronized accordingly. Temporal misalignment of gene expression and myocardial demand promotes left ventricular hypertrophy and insulin resistance and exacerbates a number of pathological processes, such as ischemia-reperfusion injury and adverse remodelling after experimental infarction.[6-10] In humans, nighttime systolic and diastolic blood pressures are more potent predictors of subsequent cardiovascular morbidity and mortality than corresponding office, average 24-hour, or average daytime ambulatory blood pressure readings,[11,12] particularly in women[13] and in patients with diabetes.[14]

OSA

OSA, resulting from complete or partial collapse of the pharynx during sleep, is the most potent expression in human

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