

Screening for Obstructive Sleep Apnea in Patients with Atrial Fibrillation

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KEYWORDS

• Obstructive sleep apnea • Atrial fibrillation • Screening • Questionnaires • Home sleep testing

KEY POINTS

- Atrial fibrillation (AF) is a common arrhythmia associated with adverse health outcomes and elevated health costs. Obstructive sleep apnea (OSA) is common among AF patients.
- OSA may contribute to the occurrence and recurrence of AF. Screening for OSA among AF patients is justified by the adverse impact OSA may cause.
- Appropriate screening strategies should be used due to the high prevalence of OSA among AF subjects and variable symptomatology.
- OSA questionnaires may have limited performance among patients with high pretest probability, such as the AF population.
- Home sleep testing (HST) is a promising alternative for screening and diagnosing OSA in AF patients. The cost-effectiveness of such approach, however, needs to be studied.

INTRODUCTION

OSA is characterized by repetitive upper airway obstruction during sleep. The most common symptoms of OSA are snoring, fatigue, disrupted sleep, and excessive daytime sleepiness.¹ Obesity, male gender, and increasing age are the most important risk factors for OSA.² There is growing evidence, however, that a significant proportion of OSA patients are minimally symptomatic and frequently also not obese. OSA may present several distinct phenotypes,³ which points to the potential necessity of simple and cost-effective diagnostic methods.

OSA is common in the general population and strikingly common among patients with

established cardiovascular disease. The high prevalence of OSA is largely due to OSA and cardiovascular disease sharing several risk factors, including male gender, obesity, sedentary life, and increasing age. In addition, OSA may independently contribute to poor cardiovascular outcome.⁴ Obstructive events during sleep cause (1) large swings in intrathoracic pressure during the futile efforts to breathe, (2) arousals from sleep, and (3) intermittent hypoxia.⁵ These 3 primary mechanisms occurring during sleep trigger a cascade of intermediate mechanisms, which may ultimately contribute to the development or recurrence of AF. There is no definitive evidence, however, that the diagnosis and treatment of OSA reduce the incidence of AF or conversely that the recognition and

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treatment of OSA among patients with established AF have a positive impact on the cardiovascular outcome. On the other hand, the recognition and treatment of OSA may also have a positive impact on quality of life.⁶ In clinical practice, OSA remains largely under-recognized among patients with established cardiovascular disease.⁷ The reasons for such low recognition include the possibility that several symptoms associated with OSA may overlap with symptoms associated with the underlying cardiovascular disease. In addition, the diagnosis of OSA has traditionally been restricted to full sleep studies, creating a potential barrier. This observation raises the question of how to recognize OSA among patients with AF.

To provide a clinical rationale to justify the screening of OSA among AF patients, the epidemiology of OSA and AF and the mechanisms by which OSA may contribute to AF are reviewed. Possible strategies to screen for OSA are then reviewed and discussed.

PREVALENCE OF ATRIAL FIBRILLATION

AF is a common arrhythmia associated with adverse consequences and high health-related cost. The clinical risk factors for AF include advancing age, diabetes, hypertension, congestive heart failure, valve disease, and myocardial infarction.⁸ The prevalence of AF in the general population is between 1% and 2% and is higher in men than in women.⁹ The risk of developing AF increases dramatically with age, and the estimated lifetime risk of developing AF is 1 in 4 for men and women ages 40 years and above.⁹ AF is the most common arrhythmia in patients older than 65 years.¹⁰ For instance, data from a cross-sectional study of adults ages 20 years or older who were enrolled in a large health maintenance organization in California estimated that the prevalence of AF increased from 0.1% among adults younger than 55 years to 9.0% in persons ages 80 years or older.¹⁰ Aging heart, characterized by myocardial fibrosis and atrial dilation, is a main risk factor for AF. Structural heart disease enforces atrial chamber abnormality, and this explains the higher prevalence of AF in patients with underlying cardiovascular conditions.¹¹ Other risk factors for AF, such as obesity and diabetes, are also steadily increasing in society. AF not only is a marker of an underlying cardiovascular disease but also, once established, an independent risk factor for stroke as well as increased mortality. The high lifetime risk of AF and increased longevity underscore the important public health burden posed worldwide.¹² The cost of AF is escalating. A systematic review of recent literature estimated the direct

costs of AF at \$2,000 to \$14,200 per patient-year in the United States and €450 to €3000 per patient-year in Europe.¹³ This is comparable to costs associated with other chronic conditions, such as diabetes. Hospitalizations were the main contributors to the high direct cost of AF.¹³

PREVALENCE OF OBSTRUCTIVE SLEEP APNEA AND ASSOCIATION WITH ATRIAL FIBRILLATION

OSA is common in the general population. A landmark Wisconsin cohort initially reported that the estimated prevalence of OSA syndrome in the general population, as defined by an apnea-hypopnea index above 5 events per hour of sleep determined by full polysomnography plus symptoms of excessive daytime sleepiness, was 2% and 4% in adult women and men, respectively.¹⁴ Several factors, however, including the increased capacity to recognize hypopneas with the use of pressure cannula, the recognition that several patients do not have symptoms of excessive daytime sleepiness, and the increasing rates of obesity of the population have led to the recognition that OSA is more common than initially imagined. For instance, the estimated prevalence of OSA among adults of the city of São Paulo, Brazil, and Lausanne, Switzerland, was estimated to be approximately 30% to 50%.^{2,15}

The prevalence of unrecognized OSA among patients with established cardiovascular disease is strikingly high. For instance, 1 study evaluated 500 consecutive outpatients from a tertiary cardiovascular university hospital and found that although only 3.1% had a previous diagnosis of OSA, more than half of the population (51.6%) had symptoms suggestive of OSA as evaluated by the Berlin questionnaire. The high prevalence of OSA was further confirmed by HST in a subset of 50 patients.⁷

The prevalence of AF among OSA patients is approximately 5%,¹⁶ which is higher than the prevalence of AF in the general population (1%–2%).⁹ On the other hand, studies that assessed the prevalence of OSA in patients with AF showed prevalence ranging from 21% to 81%.^{17–20} The impact of OSA on AF incidence, however, remains controversial. One study showed an independent association between OSA and increased AF incidence,²¹ whereas another study found an association of AF and central sleep apnea but not with OSA.²²

THE IMPACT OF OBSTRUCTIVE SLEEP APNEA ON ATRIAL FIBRILLATION

Although the precise mechanisms by which OSA is linked to arrhythmias are not fully elucidated,

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