

Sleep-Disordered Breathing and Arrhythmia in Heart Failure Patients

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KEYWORDS

- Arrhythmia • Sleep-disordered breathing (SDB) • Heart failure (HF) • Atrial fibrillation
- Sudden cardiac death

KEY POINTS

- Considering comorbidities in heart failure (HF) is important.
- Sleep-disordered breathing and arrhythmia are common in patients with HF.
- Sleep-disordered breathing and arrhythmia affect the patient's condition and prognosis, individually and through interaction.
- Sleep-disordered breathing and arrhythmia are associated with increased mortality in patients with HF.
- Treatment must consider latest research findings and outcomes.

INTRODUCTION

Despite recent strong advances in heart failure (HF) treatment, mainly in pharmacology and devices, as well as HF monitoring, patients with HF still suffer from a high burden in quality of life compromises, morbidity, and mortality.¹ Although HF is not a disease limited to the heart, rather it affects the entire organism, new approaches for understanding and improving HF are currently being studied. The recently published guideline for diagnosis and treatment of acute and chronic HF of the European Society of Cardiology focuses HF treatment not only on HF itself, but highlights the importance of attention to comorbidities in patients with HF.¹ In this context, 2 relevant and frequently

observed comorbidities in patients with HF are arrhythmias and sleep-disordered breathing (SDB), both associated with morbidity and mortality²⁻⁵ and known to worsen quality of life. Hereby, in particular, SDB is well documented to worsen quality of life, increase morbidity in general, and is clearly associated with accelerated mortality in the broad HF population.^{3,4,6,7}

Patients with HF face a high risk of cardiac arrhythmias, and its clinical presentations vary from asymptomatic incidental electrocardiographic findings to palpitations and syncope, but importantly, also sudden cardiac death (SCD).⁸ SDB is known to be underdiagnosed in patients with HF by far,⁹ as classic symptoms are lacking in these patients and cannot be reliably determined

Conflict of interest: The authors declare that they have no conflict of interest to disclose with regard to this article.

No funding received for this article.

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Sleep Med Clin ■ (2017) ■-■

<http://dx.doi.org/10.1016/j.jsmc.2017.01.003>

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through established questionnaires.¹⁰ Furthermore, no biomarker exists to identify SDB,¹¹ whereas biomarkers have a controversial, albeit firmly established, role in HF.¹ Several population-based studies have shown an association between SDB and rhythm disorders in patients with HF.^{12,13} In a recent study from Brazil, of 767 volunteers, 53.3% without SDB had cardiac rhythm disturbances, but up to 92.3% of patients with severe SDB revealed cardiac arrhythmias,¹⁴ pointing out the importance and link of both comorbidities.¹⁵ One of the most frequently emerging arrhythmias in cardiovascular medicine is atrial fibrillation (AF). Interestingly, it has just been published that in many cases the diagnosis of lone AF, AF without any other simultaneous disease, is false in many cases, as most studies that examined lone AF did not test for SDB. This suggests that many patients with lone AF have undiagnosed SDB.¹⁶

As the item-centered view extends HF and includes comorbidities now, such as the aforementioned, numerous questions arise not only on their characteristics and therapy alone, but also about their connection and therapy implications.

HEART FAILURE AND ARRHYTHMIA

HF is a major health care concern in modern medicine, as the number of patients suffering from HF is actually rising.¹ The exact prevalence of HF varies in different publications, as the definition of HF is inconsistent and deviates among the different societies.^{1,17,18} Depending on the definition used, HF prevalence is approximately 1% to 2% of the adult population in developed countries,^{1,17,18} quickly rising to more than 10% among patients older than 70.^{1,17-20} In HF, 2 major types need to be distinguished: HF with reduced ejection fraction (HFrEF) and HF with preserved ejection fraction (HFpEF).^{1,17,18} The European Society of Cardiology recently introduced a third term, HF with mid-range ejection fraction, to allow more clarification in these in-between patients.¹ Prognosis of patients with HF is still poor,²¹ and for patients older than 65 presenting to their doctor for breathlessness on exertion, 1 in 6 will have unrecognized HF, mainly HFpEF.^{1,22} Unison among all definitions, HF remains a clinical diagnosis with the symptoms in focus,¹ bearing in mind that typical symptoms and signs of HF due to fluid retention may quickly resolve with diuretic therapy.¹ Signs, such as elevated jugular venous pressure and displacement of the apical impulse, are more specific, but are harder to detect, especially in obese and elderly patients, or patients with chronic lung disease,¹ which makes taking a

detailed history and obtaining comprehensive clinical examination absolutely essential.

Appearance of arrhythmias is frequent in patients with HF and it denotes an increase in mortality.⁸ Although different types of arrhythmias, such as AF, atrial flutter, ventricular tachycardia, but also bradycardias and pauses, all contribute to deterioration in quality of life, increased hospitalization rates, and augmented mortality,⁸ their entity, combination, and characteristics are to be considered in the context of the underlying cardiac disease and the stage of HF.¹ Although the lifetime risk of developing HF at an age of 55 years is 33% for men and 28% for women,²⁰ nearly every patient is found to have some sort of arrhythmia,¹ and arrhythmia can contribute to not only lower quality of life but also increased symptoms of HF.¹

LINK BETWEEN SLEEP-DISORDERED BREATHING AND CARDIAC ARRHYTHMIA IN HEART FAILURE

Both SDB and arrhythmia have a high prevalence in patients with HF.^{1,9} Broad registries have identified a prevalence of moderate to severe SDB in patients with HF of more than 50%^{9,23} and with the numbers of comorbidities increasing, SDB prevalence reaches a percentage of more than 90%.¹⁵ In addition, cardiac arrhythmias are highly common in patients with HF.¹ Through long-term electrocardiographic recordings, premature ventricular complexes are found in nearly every patient with HF,¹ and episodes of asymptomatic, nonsustained ventricular tachycardia are common, increasing in frequency with HF severity and left ventricular dysfunction.¹ Moreover bradycardia and pauses are also frequently found, with those episodes predominantly occurring during night hours when sympathetic activity is lowered and parasympathetic activity is increased,¹ which makes underlying diseases such as SDB ominous. In this regard, the link between SDB and cardiac arrhythmias was impressively demonstrated in the DREAM study, in which compared with patients without SDB, patients with moderate to severe SDB had an almost threefold unadjusted odds of any cardiac arrhythmia.²⁴ In this study, a cross-sectional analysis of 697 veterans who underwent polysomnography,²⁴ patients with SDB still had twice the odds of having nocturnal cardiac arrhythmias even after adjustment for age, body mass index, gender, and cardiovascular disease, with the frequency of obstructive respiratory events and hypoxia predicting arrhythmia risk.²⁴

In this context, the recently published guideline for diagnosis and treatment of acute and chronic HF of the European Society of Cardiology and

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