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Commentary

Sleep apnea and atrial fibrillation: Update 2020

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The discussion around the role of sleep disordered breathing (SDB) treatment in patients with atrial fibrillation (AF) is highly dynamic [1]. In the current guideline of the European Society of Cardiology for diagnosis and management of AF, the importance of identification and management of established AF-promoting risk factors, including SDB, and unhealthy lifestyle is addressed and clearly recommended [2]. In patients with SDB, opportunistic screening for AF should be considered. Additionally, optimal management of SDB may be considered, to reduce incidence, burden, and recurrence of AF, along with improvement of symptoms.

In this commentary, we summarize recent insights in this area which may help to better understand the value of proper SDB management in AF patients.

Prevalence and impact of SDB on AF management

SDB is highly prevalent in patients with AF [3]. Important data was provided by Traaen et al., who prospectively performed polygraphy to screen for SDB in 579 patients with paroxysmal AF [4]. A total of 479 (82.7%) patients had an apnea-hypopnea index (AHI) $\geq$ 5, whereas moderate-severe SDB (AHI $\geq$ 15) was diagnosed in 244 patients (42.1%). Interestingly, patients with more severe SDB had a higher AF burden, severity and symptom score. This suggests that SDB could represent a modifiable determinant of symptom burden in AF patients and should warrant consequent management [1].

The knowledge about SDB status in AF patients is important to approximate success rates of interventions. SDB is associated with increased AF recurrence rates after antiarrhythmic drug treatment, electrical cardioversion, and catheter ablation in AF [5–7]. Observational studies and meta-analyses showed that appropriate SDB treatment may improve rhythm control in AF patients [8]. Besides this, SDB, together with concomitant obesity and chronic obstructive pulmonary disease, increases the risk of periprocedural hypoxia and carbon dioxide accumulation in AF patients undergoing AF ablation with deep conscious sedation [9–12]. In this setting, hypnotic communication for periprocedural analgesia instead of pharmacological sedation may decrease the risk of respiratory insufficiency in these patients [13,14].

Which SDB should be treated in AF patients?

Current assessment of the severity of SDB is mainly based on the AHI representing the number of hypopneas and apneas per hour of sleep [15]. However, this event-based parameter alone may not sufficiently reflect the complex pathophysiological mechanisms underlying SDB potentially contributing to AF outcome risk [16].

The current guideline of the European Society of Cardiology [2] for AF diagnosis and management mainly focus on the management of obstructive sleep apnea (OSA), which has been shown to be the predominant form of SDB in AF patients. The standard treatment of OSA is continuous airway pressure (CPAP). Whilst the relationship between OSA and AF has been established, the pathophysiological link between central sleep apnea (CSA) or Cheyne Stokes respiration and AF is less clear. Accordingly, CSA is not mentioned and no specific treatment recommendations are included in the current AF guidelines. The question remains, how we should interpret and manage CSA and CSR in AF patients [17]. Mechanisms including apnea-induced hypoxia with intermittent arousal, fluctuating levels of carbon dioxide, enhanced sympathetic/neurohormonal activation and oxidative stress causing inflammation have been implicated as etiologic causes of AF within this subpopulation [18–20]. However, it remains unclear how and whether CSA represents a treatment target to control sinus rhythm. Further studies are required to determine whether CSA treatment by e.g. adaptive servoventilation or transvenous phrenic nerve stimulation should be recommended in AF patients [21].

How to screen for SDB in AF patients

The diagnosis and treatment of sleep apnea in AF patients requires a close interdisciplinary collaboration between the

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electrophysiologist/cardiologist and sleep-specialists, possibly within an integrated care model [22–24]. In clinical practice, questionnaires are often used to decide whether a formal SDB screening should be performed [25–28]. Although questionnaires, like the Epworth sleepiness scale, can help to quantify subjective daytime sleepiness, the absence of subjective sleepiness is not a reliable means of ruling out OSA in AF patients. In 442 consecutive ambulatory patients with AF who were considered candidates for rhythm control as well as in prospectively studied 579 patients with paroxysmal AF, the Epworth sleepiness scale poorly predicted SDB, regardless of the degree of SDB tested. SDB is common but most AF patients report low daytime sleepiness levels [4,29–31]. The lack of excessive daytime sleepiness should not preclude patients from being investigated for the potential presence of concomitant SDB. Polygraphy may be a suitable method to ensure patient access and to implement screening for OSA in the standard work-up of AF patients considered for rhythm control strategies, although prospective studies in suitable AF populations are needed to validate the value of OSA screening for AF management.

If at all, SDB is often assessed only once in a structured way at the time point when AF patients present for the first time in the AF-clinic (spot-assessment of SDB). However, SDB may show a high visit-to-visit or even day-to-day variability [16]. Clinically relevant SDB will be missed if only one assessment is performed or the evaluation is only undertaken. Therefore, repeated SDB screenings may be considered, particularly if the clinical suspicion remains high [16]. Importantly, this visit-to-visit or day-to-day variability does not just complicate the detection of AF risk factors, including SDB, but may also directly result in a dynamic substrate for AF by apnea associated transient arrhythmogenic effects [32–34]. This may impact onset and offset of AF episodes and symptoms and thereby influencing AF patterns [35,36].

Hence, assessment of SDB may require a longitudinal and remote structured monitoring infrastructure. Additionally, longitudinal documentation of risk factors during a risk factor modification program may allow monitoring of the response to the intervention and adaptation and guidance as required to optimize the results. Some pacemakers can perform continuous monitoring of sleep disordered breathing [16]. Additionally, mHealth applications and technologies such as Bluetooth-linked balances may allow a widespread and affordable infrastructure for longitudinal risk factor identification and monitoring [37–41]. Implementation of infrastructures for longitudinal assessment of variables such as risk factors, lifestyle components or rate and rhythm information require adaptation of existing care coordination and clinical pathways [37].

Conclusion

AF patients typically present with predominant OSA and OSA management is recommended by current AF guidelines [2]. The lack of excessive daytime sleepiness should not preclude AF patients from being investigated for the potential presence of concomitant SDB. Although technologies for longitudinal monitoring of lifestyle components and AF risk factors, including SDB monitoring, are available, legal considerations and missing reimbursement models are still blocking the wide implementation in existing clinical pathways [42].

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Conflict of Interest

The authors report no relationships that could be construed as a conflict of interest.

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