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Sleep apnea and atrial fibrillation – A different kind of rhythm

Susana Sousa *
CUF Infante Santo Hospital, CUF Descobertas Hospital, S. Bernardo Hospital, Nova Medical School, Portugal

Pedro Silva Cunha
Arrhythmology, Pacing and Electrophysiology Unit, Cardiology Service, Santa Marta Hospital, Central Lisbon Hospital University Center, Portugal

Mário M. Oliveira
Arrhythmology, Pacing and Electrophysiology Unit, Cardiology Service, Santa Marta Hospital, Central Lisbon Hospital University Center, Faculty of Medicine, Lisbon University, Portugal

Marta Drummond
Pulmonology Department Hospital São João, Porto, Medicine Faculty of Porto University, Portugal

António Bugalho
CUF Infante Santo Hospital, CUF Descobertas Hospital, Nova Medical School, Portugal

Atrial Fibrillation (AF) and Obstructive Sleep Apnea Syndrome (OSAS) are high-prevalence diseases. AF is the most common cardiac arrythmia and OSAS is the most frequent sleep-related breathing disorder. Their relationship is not fully understood and goes beyond being common conditions and sharing risk factors such as obesity, hypertension, older age, diastolic dysfunction and smoking habits. Several studies confirm an independent association between AF and OSAS [1,2,3].

In this context, we read with great interest the work published by Traaen et al. in IJC Heart & Vasculature [4]. The authors prospectively investigated clinical and polygraphic characteristics in a large sample of patients with paroxysmal AF. They found that OSAS was highly prevalent in the studied population although most patients had few or no symptoms of hypersomnolence. This has been described in AF patients [5] making OSAS diagnosis difficult in this specific population [6]. The lack of a sensitive or specific questionnaire implies that a sleep study is crucial to achieve diagnosis. The question is which sleep study one should choose and for how many nights should be performed. Traaen et al used a type 3 polygraphic recorder for 2 nights and characterised sleep apnea according to Apnea-Hypopnea Index (AHI). In OSAS, diagnosis and treatment are still based on a single number: AHI, as stated by the American Academy of Sleep Medicine [7], but OSAS is a complex entity with multiple dimensions and other parameters should be part of OSAS management plan. Linz et al. have published a comprehensive review of available metrics for sleep disordered breathing [8]. Besides AHI, nocturnal oxygen saturation can be a predictor of AF [9,10]. Total sleep time spent below 90% oxygen saturation level can also be quantified and has been described as a significant and independent factor related to cardiovascular mortality [11]. Hypoxic burden, a recently described parameter, can also be of significant value. This criterion relates to depth and duration of respiratory events, can be derived from polysomnography, and predicts cardiovascular mortality across populations better than AHI or oxygen desaturation index [12]. Another important parameter, described by Butler et al. [13], is apnea-hypopnea event duration, a marker for low arousal threshold, that may be a predictor of mortality in men and women. This community-based prospective cohort found that short respiratory events may predispose to increased ventilatory instability and augmented autonomic nervous system responses, being also a predictor of mortality. However, polygraphy and polysomnography can be expensive, time-consuming, and difficult to offer to all patients with AF. And for how many nights? In the study by Traaen et al. ambulatory polygraphy was performed for 2 nights with no significant variability between them. On contrary, another study showed that long-term sleep apnea monitoring may be needed due to night-to-night variability, which can make sleep disorder diagnosis more difficult [14]. According to these authors, respiratory events are not stable over time, this variability seems to be higher in non-severe patients and is associated with arrhythmogenic consequences. Variability over time may also be present in ambulatory ECG monitoring. The optimal duration of monitoring for AF is yet to be determined but extending the duration with continuous ECG monitoring has been shown by multiple studies to substantially increase the chances of detecting silent AF episodes.

Currently, OSAS remains underdiagnosed and undertreated. Patients with AF are at greater risk for sleep disordered breathing and should be evaluated for OSAS. Some publications documented that OSAS-AF patients have a greater risk of AF recurrence after catheter ablation than those without OSAS [15] and are more likely to progress to permanent AF. With the current OSAS diagnosis algorithm it is not possible to screen all AF patients but there is current evidence that identifying these patients may lead to a change in arrythmia prognosis. We would like to praise Dr. Traaen and colleagues for reinforcing the urgent need for diagnostic and

* Corresponding author at: CUF Infante Santo Hospital, CUF Descobertas Hospital, S. Bernardo Hospital, Nova Medical School, Portugal.
E-mail address: susana.varela@jmellosaude.pt

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therapeutic guidelines in this specific population. Different strategies have been proposed for prediction of OSAS in AF patients but need further validation. A methodical and easy assessment of OSAS in all AF patients would be desirable given its impact on prognosis. Since OSAS is a complex disorder with an important relationship to cardiovascular diseases we suggest starting to manage these patients in Heart & Lung teams. Multidisciplinary work can provide a better understanding of the correlation between cardiac biomarkers and polysomnographic features and investigating the value of new diagnostic methods, such as Holter-polygraph or newer and smaller wearable devices to record more than one night.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijcha.2020.100548.

References

[1] R. Mehra, E.J. Benjamin, E. Shahar, et al., Association of nocturnal arrhythmias with sleep-disordered breathing: the sleep heart health study, Am. J. Respir. Crit. Care Med. (2006), https://doi.org/10.1164/rccm.200509-1442OC.
[2] A.S. Gami, P.A. Friedman, M.K. Chung, S.M. Caples, V.K. Somers, Therapy insight: Interactions between atrial fibrillation and obstructive sleep apnea, Nat. Clin. Pract. Cardiovasc. Med. (2005), https://doi.org/10.1038/ncpcardio0130.
[3] E. Zhao, S. Chen, Y. Du, Y. Zhang, Association between sleep Apnea hypopnea syndrome and the risk of atrial fibrillation: a meta-analysis of cohort study, Biomed. Res. Int. (2018), https://doi.org/10.1155/2018/5215868.
[4] G.M. Traaen, B. Øverland, L. Aakerøy, et al., Prevalence, risk factors, and type of sleep apnea in patients with paroxysmal atrial fibrillation, IJC Hear Vasc. (2020), https://doi.org/10.1016/j.ijcha.2019.100447.
[5] K. Kadhim, M.E. Middeldorp, A.D. Elliott, et al., Self-reported daytime sleepiness and sleep-disordered breathing in patients with atrial fibrillation: SNOozE-AF, Can. J. Cardiol. (2019), https://doi.org/10.1016/j.cjca.2019.07.627.
[6] K. Kadhim, D.H. Lau, P. Sanders, D. Linz, Sleep apnea in atrial fibrillation – Highly prevalent, highly relevant, but most patients are not somnolent!, IJC Hear Vasc. (2020), https://doi.org/10.1016/j.ijcha.2019.100463.
[7] L.J. Epstein, D. Kristo, P.J. Strollo, et al., Clinical guideline for the evaluation, management and long-term care of obstructive sleep apnea in adults, J. Clin. Sleep Med. (2009), https://doi.org/10.1038/nsmb.1509.
[8] D. Linz, M. Baumert, P. Catcheside, et al., Assessment and interpretation of sleep disordered breathing severity in cardiology: clinical implications and perspectives, Int. J. Cardiol. (2018), https://doi.org/10.1016/j.ijcard.2018.04.076.
[9] C.-Y. Chen, C.-H. Ho, C.-L. Chen, C.-C. Yu, Nocturnal desaturation is associated with atrial fibrillation in patients with ischemic stroke and obstructive sleep Apnea, J. Clin. Sleep Med. (2017), https://doi.org/10.5664/jcsm.6594.
[10] R. Mehra, J. Bena, H.K. Walia, Clarifying the role of hypoxia in obstructive sleep apnea as a potential promulgator of atrial fibrillation in ischemic stroke, J. Clin. Sleep Med. (2017), https://doi.org/10.5664/jcsm.6578.
[11] M. Baumert, S.A. Immanuel, K.L. Stone, et al., Composition of nocturnal hypoxaemic burden and its prognostic value for cardiovascular mortality in older community-dwelling men, Eur. Heart J. (2020), https://doi.org/10.1093/eurheartj/ehy838.
[12] A. Azarbarzin, S.A. Sands, K.L. Stone, et al., The hypoxic burden of sleep apnoea predicts cardiovascular disease-related mortality: the Osteoporotic Fractures in Men Study and the Sleep Heart Health Study, Eur. Heart J. (2019), https://doi.org/10.1093/eurheartj/ehy624.
[13] M.P. Butler, J.T. Emch, M. Rueschman, et al., Apnea-hypopnea event duration predicts mortality in men and women in the sleep heart health study, Am. J. Respir. Crit. Care Med. (2019), https://doi.org/10.1164/rccm.201804-0758OC.
[14] D. Linz, M. Baumert, L. Desteghe, et al., Nightly sleep apnea severity in patients with atrial fibrillation: potential applications of long-term sleep apnea monitoring, IJC Hear Vasc. (2019), https://doi.org/10.1016/j.ijcha.2019.100424.
[15] F.M. Szymanski, K.J. Filipiak, A.E. Platek, et al., Presence and severity of obstructive sleep apnea and remote outcomes of atrial fibrillation ablations — a long-term prospective, cross-sectional cohort study, Sleep Breath. (2015), https://doi.org/10.1007/s11325-014-1102-x.