P wave characterization during respiratory events in sleep apnea patients with and without paroxysmal atrial fibrillation

Authors

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Abstract

Individuals with obstructive sleep apnea (OSA) have a higher prevalence of atrial fibrillation (AF) compared to the general population. However, OSA is a multifaceted condition. We hypothesize that the pro-arrhythmic consequences of OSA might differ among patients and that the P-wave characteristics, a common marker for AF propensity, will differ during respiratory events in patients with OSA and paroxysmal AF compared to OSA alone.

To test this hypothesis and extend previous literature, we collected data from patients with AF and high risk of OSA (STOP-BANG questionnaire $\geqslant$4 or positive WatchPAT) and retrospectively matched them with OSA-only patients. Both underwent a full polysomnography in a sleep clinic. The population of 68 AF+ patients was matched for sex proportion (12/68 female), age (61±6 years), body-mass-index (29.5±3 kg/m2), and apnea-hypopnea index (27.9±9.6 events/hour).

For each patient's ECG during polysomnography (lead II, 512Hz), we calculated the area and duration of all P-waves with a robust delineation algorithm. We calculated the features' median in each recording for specific sleep events: 60s baseline before sleep onset, the first, last and longest respiratory events, and those with the lowest oxygen nadir and largest hypoxic burden (SpO2 area between the end of the event and the nadir). We tested feature differences between AF+ and OSA-only patients with Wilcoxon rank-sum test.

Our results indicate significantly shorter P-waves in AF+ patients at baseline and during events (median 106ms versus 122ms), except for the last (p=0.16) and largest burden (p=0.32) events. The P-wave area shows a similar tendency (AF+ median 4744 uV*ms versus OSA-only 5996 uV*ms), but the differences are not significant (p>0.1 except for baseline and last event).

We conclude that changes in P-wave characteristics during OSA-events differ between patients with and without AF. Further studies will explore how OSA severity, sleep depth and body position affect P-wave characteristics.
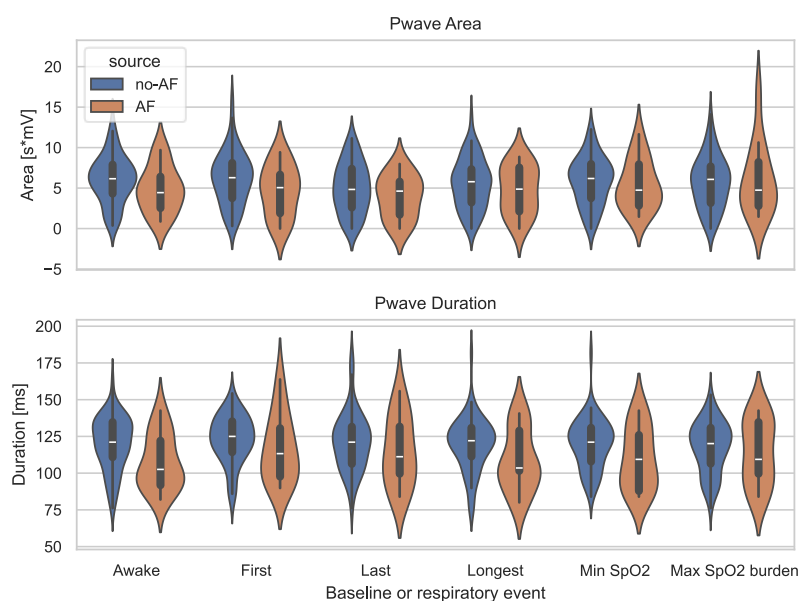
Figure 1 Comparison of Pwave duration and area in AF+OSA and OSA-only patients across multiple events