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Title: Day-night pattern of defibrillator shocks in patients with chronic heart failure: The impact of Cheyne-Stokes respiration and obstructive sleep apnoea

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Body: Introduction: This study aims to clarify the impact of obstructive (OSA) or central (CSA) sleep apnoea on the circadian pattern of malignant arrhythmic events. Methods: In total 146 patients (pts) with chronic heart failure (CHF; LVEF $\leq 45\%$, NYHA-class ≥ 2) and implanted defibrillator (ICD) were screened for the coexistence of OSA and CSA (Apnoea-Hypopnea-Index $\geq 10/h$). During follow-up (median 48 months) time of day of adequate ICD-shocks and overall ICD-therapies were recorded by device logs. Results: In total 171 appropriate ICD-therapies including 57 shocks were delivered. From 0 to 6 am, ICD-shocks occurred in 50% of pts with OSA, 16% of pts with CSA, and 11% of pts with no sleep-disordered breathing (noSDB; OSA vs. noSDB: $P=0.02$; CSA vs. noSDB: $P=0.68$). ICD therapies from 0 to 6 am were delivered to 35% of pts with OSA, 23% of pts with CSA, and 20% with noSDB (OSA vs. noSDB: $P=0.13$; CSA vs. noSDB: $P=0.86$). For people with OSA, the relative risk (RR) of ICD-shocks from 0 to 6 am was 3.00 (95% CI 1.28 to 7.06, $P=0.03$) and of ICD therapies 1.60 (95% CI 0.96 to 2.66, $P=0.12$), respectively. For CSA pts the RR of ICD shocks from 0 to 6 am was 0.60 (95% CI 0.22 to 1.58, $P=0.41$) and of ICD therapies 0.91 (95% CI 0.53 to 1.45, $P=0.74$), respectively. Conclusion: In pts with CHF coexistence of OSA is associated with an enhanced risk for ICD-shocks during sleeping hours. Contrastingly, in CSA pts no such altered circadian variation was seen. As underlying respiratory instability and neurohumoral disorders are not exclusively found during sleep, nocturnal treatment of CSA might be insufficient to completely abolish adverse effects.