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Title: Different effects of adaptive servoventilation therapy in awake and asleep heart failure patients with Cheyne-Stokes respiration and healthy volunteers

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Body: Cheyne-Stokes respiration (CSR) in heart failure (HF) is characterized by chronic hyperventilation with low-normal to depressed pCO₂. Adaptive servoventilation therapy (ASV) was introduced to stabilize respiration in these patients. This study investigates acute effects of ASV on pCO₂ and oxygen saturation (SaO₂) in HF patients with CSR and healthy volunteers (HV), respectively. HF patients (EF ≤ 50%, NYHA ≥ II) with CSR (AHI ≥ 15/h) and HV were ventilated using a new ASV device (PaceWace™, ResMed) for 1h. PCO₂ and SaO₂ were assessed transcutaneously, while vigilance was analyzed using EEG recordings. Results were obtained during ASV ventilation while awake and asleep and compared to those being obtained 30 minutes before and after ventilation. A total of 20 HF patients (19 male; 79±12 years; LV-EF 36±8%; AHI 36±14/h; EPAP 8.9±0.5 cmH₂O; IPAP 17.1±0.5 cmH₂O) and 15 HV (13 male, 25±4 years, EPAP 8.4±1.8 cmH₂O, IPAP 14.5±2.4 cmH₂O) were included. As compared to baseline values, ASV was accompanied with a decrease in pCO₂ (34.4±3.2 vs. 33.7±3.8mmHg) and an increase in SaO₂ (93.8±2.6 vs. 94.9±2.6%) in HF patients as well as in HV (pCO₂: 39.5±3.0 vs. 38.2±3.8mmHg, SaO₂: 96.9±1.3 vs. 97.8±0.9%), as long as they were awake. While asleep, pCO₂ raised and SaO₂ fell in HF patients (pCO₂ 36.3±3.8mmHg, SaO₂ 93.8±2.6%) as well as in HV (pCO₂ 41.7±3.0mmHg, SaO₂ 97.1±1.2; p<0.05 for all comparisons). While CSR in HF patients is characterized by hyperventilation with low pCO₂, ASV therapy might lead to further hyperventilation as long as patients are awake. While asleep, pCO₂ increase to mid-normal values while SaO₂ stay within normal range.