Utility of transthoracic impedance and novel algorithm for sleep apnea screening in pacemaker patient

Ruohan Chen  
Keping Chen  
Yan Dai  
Shu Zhang

**Introduction**: Pacing patients was revealed with a high prevalence of sleep disorder, but mostly undiagnosed. The pacemaker with transthoracic impedance sensor and novel algorithm could identify sleep apnea (SA) event. This study aimed to evaluate accuracy of pacemaker in sleep apnea diagnosis.

**Methods**: This is a prospective study enrolled patients implanted with pacemakers integrated with transthoracic impedance sensor and SA identified algorithm (AP Scan). All patients underwent a polysomnography (PSG). The apnea and hypopnea index (AHI) of the PSG (PSG-AHI) and the respiratory disturbance index (RDI) of the pacemaker (PM-RDI) were recorded on the same night. The correlation between two methods was evaluated by the kappa coefficient, receiver operating characteristic (ROC) curves and Bland and Altman statistics.

**Result**: Sixty-four patients were enrolled, who had never been diagnosed with SAS or underwent RsPSG exam. After PSG examination, 76.4% patients were diagnosed as combining with SA (20% severe, 18.2% moderate, and 38.2% mild). RDI calculated by PM has a strong positive correlation with PSG-AHI ($r=0.76$, $p < 0.001$, 95% CI: 0.61 - 0.85). The optimal cut-off value of PM-RDI for advanced SAS (PSG-AHI≥15) diagnosis was 26, with AUC of 0.89 (95%CI 0.77 to 0.96, $P<0.001$). The best cut-off value for severe SA (PSG-AHI≥30) identification was 41, with a sensitivity of 81.6%, a specificity of 88.6%.

**Conclusion**: Pacemaker patients present a high prevalence of undiagnosed SA. Detection of SA by pacemaker is feasible and accurate in SA screening and monitoring.