Changes in haemodynamic parameters during pulmonary vein isolation using cryo-balloon in patients with paroxysmal atrial fibrillation

Mohammad Alasti
Emily Kotschet
Logan Bittinger
Stewart Healy
David Adam
Jeffrey Alison

Introduction: Pulmonary vein isolation (PVI) is the most common ablation strategy in patients with symptomatic paroxysmal atrial fibrillation (PAF). The aim of this study was the evaluation of changes in haemodynamic parameters during PVI in comparison to slow pathway ablation.

Methods: We recruited patients with PAF who were candidates of pulmonary vein isolation using cryo-balloon, and patients with atrioventricular reentrant tachycardia (AVNRT) for radio-frequency ablation. Finapres NOVA system was used to measure and record heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), stroke volume (SV), cardiac output (CO), inter-beat interval (IBI), stroke volume index (SVI), cardiac output index (COI), $dP/dT$, systolic blood pressure index (SBPI), diastolic blood pressure index (DBPI) and rate pressure product (RPP) during the procedure. Ablation was performed with conscious sedation in all patients. All patients had successful pulmonary vein isolation and slow pathway ablation without any complications.

Result: Twenty patients with PAF during pulmonary vein isolation using cryo-balloon (mean age: 59.5±6.9 years) were compared to ten patients during AVNRT ablation (mean age: 55.6 ±17 years). During PVI, mean RPP decreased from 8027 mmHg/minute to 6816 mmHg/minute, then increased to 9032 mmHg/minute at the end; mean $dP/dT$ rose from 896 mmHg/s to 1478 mmHg/s while other parameters including HR and IBI did not change significantly. In comparison, during SVT ablation, mean HR, mean SV, mean SVI, mean CO, mean COI and mean RPP increased and IBI diminished (from 1185 milliseconds to 815 milliseconds), whilst mean $dP/dP$ did not alter significantly. Moreover, we observed vagal reaction in 6 (30%) patients during PVI, while there was none in patients during SVT ablation.

Conclusion: Our data shows that PVI using cryo-balloon causes different haemodynamic changes in comparison to AVNRT ablation. Vagal stimulation is postulated to be the main mechanism of these haemodynamic changes during PVI.