Rapid ventricular pacing using pre-existing cardiac implantable electronic devices in patients undergoing transcatheter aortic valve implantation

Chang Nancy Wang MD, Paul G. Malik MD FRCPC, Darrin M. Payne MD FRCSC, Tarit Saha MD FRCPC, Fabrizio Rosati MD FRCSC, Nasser AlHammad MD, Adrian Baranchuk MD FACC FRCPC FCCS

Background
Transcatheter aortic valve implantation (TAVI) has been established as an alternative for patients with severe symptomatic aortic stenosis in whom the risks of surgical aortic valve replacement (SAVR) are prohibitive. Current standard of practice describes the use of rapid ventricular pacing (RVP) to induce a transient cardiac standstill for accuracy during prosthetic valve deployment. This is most commonly achieved using a transvenous temporary right ventricular pacing wire, a procedure which can generate unnecessary complications. We describe our experience using a pre-existing cardiac implantable electronic device (CIED) to achieve RVP in patients undergoing TAVI using non-invasive program stimulation (NIPS).

Methods
Prospective, observational, single center study including 29 consecutive patients who underwent transaortic TAVI at the Kingston Health Sciences Center; between November 2018-April 2019. Five of these patients (17%) were identified to have a pre-existing CIED. All patients underwent device interrogation within 1 month prior to the TAVI date. Program output was set to 5 V at 1 ms. Ventricular capture was checked at a pacing rate of 180 bpm (Medtronic devices) or 181.8 bpm (Abbott devices, equivalent output of 330 ms) for 3 seconds using NIPS (test phase). RVP was performed at 180 bpm at the time of valve deployment with a target systolic blood pressure of less than 70 mmHg. After TAVI completion, a full interrogation of the CIED was performed in the recovery unit.

Results
Five patients underwent RVP using a pre-existing CIED with no complications. External pacing was not required in any of the cases. All patients underwent implantation of an Edwards SAPIEN3 prosthetic valve. One patient failed initial ventricular capture (test phase) and required 7.5 V at 1ms for full capture. The duration of RVP was determined at the discretion of the lead interventional cardiologist, generally lasting 14-16 seconds. Procedure costs were reduced by CAD$159 per person through elimination of the temporary pacer wire.

Discussions
We present our initial series of RVP achieved through a pre-existing CIED to allow for prosthetic valve deployment during TAVR. Transvenous temporary pacing wire insertion in patients with pre-existing CIED can be challenging and can introduce unnecessary risks such as displacement of pre-existing leads, pneumothorax and tamponade. Though our clinical series is limited to a single center with a small sample size, our initial experience demonstrates the feasibility, safety and cost-effectiveness of using pre-existing CIEDs to achieve RVP in patients undergoing transfemoral TAVR. Further experiences are needed to confirm these results.