Transcatheter aortic valve implantation without contrast media technique in chronic kidney disease population – pilot study

Heart Institute of the University of Sao Paulo (InCor), Sao Paulo, Brazil

Funding Acknowledgement: Type of funding sources: Private grant(s) and/or Sponsorship. Main funding source(s): MedtronicAngiodroid

Background/Introduction: Acute Kidney Injury (AKI) is frequently observed after Transcatheter aortic valve implantation (TAVI), with rates ranging from 3% to 50%. In the Brazilian TAVI Registry, the incidence of AKI following TAVI was 18%, with 4.5% requiring dialysis. Its occurrence is associated with an increase in 3-fold all-cause and cardiac death. Since AKI is related to the volume of contrast media, avoiding contrast during TAVI procedure is advisable, especially in chronic kidney disease (CKD) patients.

Purpose: The aims of the proposed study are to: (1) evaluate the feasibility and safety of a zero-contrast technique for CKD patients undergoing TAVI and (2) define the role of each of the non-contrast imaging modalities in the preoperative assessment for TAVI and (3) evaluate the incidence of AKI post-TAVI in this population.

Methods: Patients with severe symptomatic aortic stenosis (AS) and CKD stage ≥3a where evaluated for TAVI with four preoperative exams: transesophageal echocardiogram (TEE), cardiac magnetic resonance, contrast and noncontrast computed tomography (MDCT) and aortoiliac co2 angiography. After safety measures of transfemoral (TF) viability and aortic valve favorable anatomy, patients were submitted to TF-TAVI with self-expandable Evolut R/Pro. The contrast MDCT was blinded to the operators and it is checked before the procedure, at a safety checkpoint, to exclude high-risk conditions not detected by non-contrast methods. During the procedure, another safety checkpoint was accomplished. Clinical and echocardiographic outcomes were assessed at 30 days.

Results: Between December 2020 to December 2021, a total of 25 patients underwent TF TAVI with zero-contrast technique. Mean age of 79.9±6.1 years, 52% male, 18 patients (72%) NYHA functional class III or IV, mean STS-PROM 3.0±1.5%, 12% had severe systolic dysfunction (left ventricle ejection fraction <35%) and mean creatinine clearance of 49.1±7 mL/min. Self-expandable Evolut R was implanted in 80% of patients and Evolut Pro in 20% of them, the most frequent THV size was 29 mm (52%) and the mean implant depth was 6 mm in fluoroscopy and 4.5 mm in TEE. The mean procedural time was 138±56 minutes, with a median radiation dose of 6.6 mGy/cm² [IQR, 2–6 mGy]. Definitive pacemaker was implanted in 17% of patients and AKI was seen in 6 patients (24%), with stage I (20%), stage II (4%) and no case needed hemodialysis. At 30 days, 84% were at functional class I, there was no death, one embolization requiring a second valve and the rate of device success (VARC-2) was 92%.

Conclusion: The proposed pilot study for transfemoral TAVI in CKD population with zero contrast technique was safe, with promising results and similar rates of success and complication, compared with the conventional TAVI approach.

Figure 1. Non-Contrast TAVI planning methods

Figure 2. Fluoro and Echo-guided procedure