Two techniques to prevent coronary occlusion in patients with heavily calcified leaflets

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Introduction
Coronary obstruction remains a rare but potentially life-threatening complication of TAVI. The amount and distribution of calcium in the native annulus and aortic root are key factors to consider when planning a Transcatheter Aortic Valve Implantation. Several conditions might predispose to coronary occlusion. A low-lying coronary ostium, a narrow root, an excessively enlarged valve leaflet, or bulky native leaflets may lead to coronary occlusion during valve implantation. This case study presents two techniques to prevent this issue.

Case Presentation
The patient underwent TEE and Multi Slice Computed Tomography. TEE revealed a 22 mm annulus (Fig 1) while MSCT revealed a 19 mm x 27 mm (area-derived diameter of 23 mm) heavily calcified annulus with severe leaflet calcification endangering the right ostium.

PATIENT DATA
- 82 year-old female
- Severe AS
- Mild AR
- LES: 27.5%
- AVA: 0.5 cm²
- Pmax/Pmean: 98/58 mmHg
- LVEF: 60%
- NYHA class: III

MEDICAL HISTORY
- Stenosis of LAD and CX
- Arterial hypertension, PVD and a femoral A/V fistula

Aortic annulus measurement on TEE

Severe leaflet calcification endangering the right ostium
calcifications extending above and below the annular level, and a bulky right coronary cusp (Fig 2). This raised concern about a potential coronary occlusion of the right coronary artery. As the patient was of slight build and considering the annulus size and morphology, as well as the high degree of calcification, a size S ACURATE TA valve seemed the best option. The ACURATE S (small) valve measures 23 mm at the level of the waist and 3 mm more at the level of the upper and lower crown thus allowing for some tolerance in adapting to the native annulus (Fig 3).

**Case Strategy**

Due to the risk for right coronary artery occlusion by the heavily calcified cusp, it was decided to use Alain Cribier’s technique\(^1\). This technique consists of injecting contrast during balloon aortic valvuloplasty (BAV) to observe the perfusion to the coronary arteries (Fig 4). Lack of perfusion may be

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a sign of a very calcified cusp that occludes the coronary ostia. In that case, the procedure may be switched to conventional surgery. BAV with contrast indicated that there was no risk of coronary occlusion so it was decided to proceed with the implantation. The design of this bioprosthesis allows the upper crown to engage the calcified cusps during partial release. Then, by pulling gently on the delivery system, the calcified leaflets are moved down, away from the coronary ostia, thus protecting the coronaries (Fig 5).

Results
After successful deployment of the bioprosthesis, the final angiography showed minimal paravalvular leak (Fig 6) with a mean gradient of 8 mmHg.

Key learnings
In patients with highly calcified leaflets, ACURATE TA provides a way to protect the coronaries. Placing the prosthesis in a supra-annular position with the upper crown slightly open, the calcified cusps can be pulled down, away from the coronaries.

References