

Anatomical relationship after transcatheter aortic valve implantation with commissural alignment and left main percutaneous coronary intervention

Dávid Bauer ^{1,2}, Claudio Montalto ^{1*}, Pasquale Tavoletta¹, and Francesco Soriano¹

¹Interventional Cardiology, 1st Division of Cardiology, De Gasperis Cardio Center, Niguarda Hospital, Piazza Ospedale Maggiore 3, Milan 20162, Italy; and ²Department of Cardiology, Third Faculty of Medicine, Charles University and University Hospital Královské Vinohrady, Prague, Czech Republic

Received 23 March 2023; revised 14 August 2023; accepted 15 September 2023; online publish-ahead-of-print 19 September 2023

ESC Curriculum 3.1 Coronary artery disease • 3.3 Chronic coronary syndrome • 4.2 Aortic stenosis

Patients with severe aortic stenosis (AS) and indication to complex percutaneous coronary intervention (ASCoP) pose technical challenges, and a possible therapeutic algorithm has been proposed recently.¹ In this paper, we present the 1-year three-dimensional computed-tomography follow-up of a 78-year-old patient with multiple risk factors admitted for unstable angina and dyspnoea at minimal efforts in the context of severe AS and critical calcific stenosis involving distal left main (LM) and the ostium of a dominant left circumflex. In brief, Heart Team evaluation concluded in favour of a fully percutaneous treatment due to high surgical risk (EuroScore II 4.4%, STS 4.0%) and numerous comorbidities, including chronic obstructive pulmonary disease and prior percutaneous coronary intervention (PCI) due to previous anterior myocardial infarction. Furthermore, it was chosen to treat severe AS with transcatheter aortic valve implantation (TAVI) upfront and subsequent complex PCI of the LM bifurcation considering the predicted easy coronary access using the ACURATE Neo2 prosthesis (Boston Scientific, Marlborough, MA, USA). Of note, the overall high-risk associated with this complex PCI was anticipated to be reduced by abolishing severe AS with upfront TAVI while using a self-expandable valve was expected to minimize the need of rapid pacing with an ongoing LM critical stenosis.

In [Figure 1](#), the anatomical relationship between the implanted TAVI prosthesis and the coronary stent frames is shown (see [Supplementary material online, Video S1](#)). An ACURATE Neo2 valve was implanted before performing a complex PCI in the same procedural session. Intra-vascular ultrasound (IVUS) confirmed a severely diseased LM

with long, thick calcium plaque involving the proximal circumflex and no adequate landing zone in the proximal LM. Therefore, after extensive calcium debulking with rotational atherectomy (RotaPRO; Boston Scientific), two stents were implanted with T and Protrusion technique. Final IVUS pullbacks confirmed optimal result with adequate expansion and apposition and only minimal protrusion in the aorta through the stabilizing arches.

The ACURATE Neo2 is a self-expandable valve that showed high rates of commissural alignment,² which is the optimization of the anatomical relationship between the neo-commissures and the coronary artery ostia through device-specific and patient-specific orientations at deployment. With this specific device, commissural alignment is aided by orientation of the free stent strut and of radiopaque posts in cusp overlap view. Future coronary access is further optimized by the valve's tall and wide stabilizing arches and supra-annular stent-free leaflets. (see [Supplementary material online, Video S2](#)) Other valve models also allow for specific orientation and facilitated coronary access, especially those designed with a shorter valve frame.³ Therefore, in these complex scenarios, the choice of the valve should be tailored upon individual patients' anatomy, as shown by computed tomography (CT) scan, and according to the procedural strategy (need of easy coronary re-access, use of rapid pacing, etc.).

In this case, commissural alignment with an ACURATE Neo2 prosthesis allowed for the valve to be oriented correctly ([Figure 1A](#)) with a large uncovered area below the stabilizing arches and no obstruction for the LM ostium, subsequently covered with minimal protrusion of

* Corresponding author. Tel: +02 64442308, Email: cm.claudio.montalto@gmail.com

Handling Editor: Amir Khalifa

Peer-reviewers: Ryaan El-Andari; Francesco Giannini; James Dargan

© The Author(s) 2023. Published by Oxford University Press on behalf of the European Society of Cardiology.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

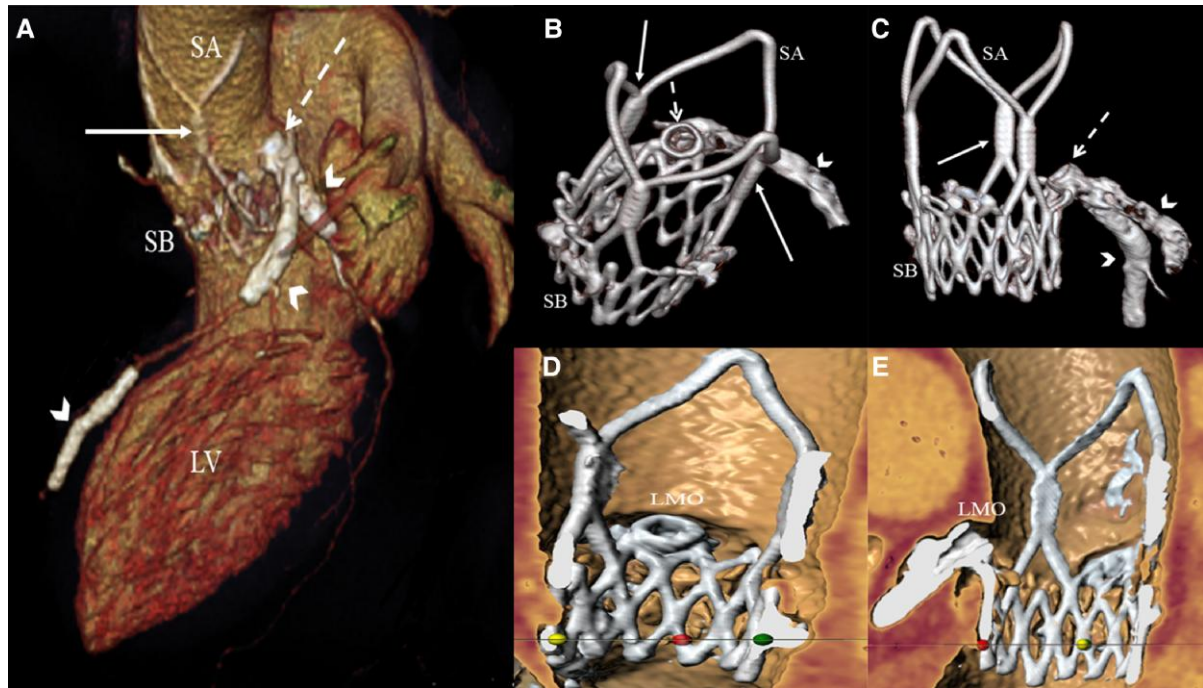


Figure 1 Anatomical relationship after TAVI and LM-PCI. SB, stent body; SA, stabilizing arches, full arrow—valve commissures, dotted arrow—left main stent, arrow heads—stents in left anterior descending and circumflex artery; LMO, left main ostium, yellow dot—noncoronary cusp, green dot—right coronary cusp, red dot—left coronary cusp.

the stent in the ascending aorta (Figure 1B–E). At 1-year, the patient was asymptomatic with no anginal symptoms and improved functional capacity. The CT-scan showed patency of the implanted stents.

Supplementary material

Supplementary material is available at *European Heart Journal – Case Reports* online.

Acknowledgements

Many thanks to Dr Jacopo A. Oreglia for valuable advice and extraordinary professional guidance in the clinical management of this case.

Consent: Written consent for submission and publication of this case report including images and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: None declared.

Funding: None declared.

Data availability

No new data were created or analysed in this article.

References

1. Soriano F, Montalto C, Calderone D, Nava S, Esposito G, Saia F, et al. Transcatheter treatment of severe aortic stenosis in patients with complex coronary artery disease: case series and proposed therapeutic algorithm. *Eur Heart J Case Rep* 2022;**6**:ytac399.
2. Bieliauskas G, Wong I, Bajoras V, Wang X, Kofoed KF, De Backer O, et al. Patient-specific implantation technique to obtain neo-commissural alignment with self-expanding transcatheter aortic valves. *JACC Cardiovasc Interv* 2021;**14**:2097–2108.
3. Raschpichler M, Flint N, Yoon SH, Kaewkes D, Patel C, Singh C, et al. Commissural alignment after balloon-expandable transcatheter aortic valve replacement is associated with improved hemodynamic outcomes. *JACC Cardiovasc Interv* 2022;**15**:1126–1136.