Transcatheter aortic valve implantation and hybrid coronary revascularization in a patient with severe aortic stenosis, complex coronary artery disease, and porcelain aorta

Jacek Legutko¹, Łukasz Wiewiórka², Jacek Piątek³, Jarosław Trębacz³, Robert Sobczyński⁴, Maciej Stąpór³, Janusz Konstanty-Kalandyk³, Bogusław Kapelak¹, Paweł Kleczyński¹

¹Institute of Cardiology, Department of Interventional Cardiology, John Paul II Hospital, Jagiellonian University Medical College, Kraków, Poland
²Clinical Department of Interventional Cardiology, John Paul II Hospital, Kraków, Poland
³Institute of Cardiology, Department of Cardiac Surgery and Transplantation, John Paul II Hospital, Jagiellonian University Medical College, Kraków, Poland
⁴Clinical Department of Cardiac Surgery and Transplantation, John Paul II Hospital, Kraków, Poland

Correspondence to:
Prof. Jacek Legutko, MD, PhD,
FESC,
Department of Interventional Cardiology, John Paul II Hospital,
Jagiellonian University Medical College, Institute of Cardiology,
Pząbrska 80, 31–202 Kraków,
Poland,
phone: +48 12 614 35 01,
e-mail: jacek.legutko@uj.edu.pl
Copyright by the Author(s), 2021
DOI: 10.33963/KP.a2021.0097
Received: June 27, 2021
Revision accepted: August 30, 2021
Published online: August 31, 2021

Transcatheter aortic valve implantation (TAVI) and percutaneous coronary intervention (PCI) are recommended therapeutic options in patients with severe aortic stenosis (AS), concomitant coronary artery disease (CAD), and porcelain aorta [1, 2]. However, in patients with complex left main coronary artery (LM) and multivessel disease (MVD), PCI remains a high-risk procedure associated with worse long-term clinical outcomes compared to surgical revascularization [3]. Hybrid coronary revascularization (HCR), a minimally invasive revascularization strategy, in which the durability of the internal mammary artery to the left anterior descending artery graft is combined with advantages of PCI to treat remaining lesions, may be beneficial for such patients [4].

A 63-year-old female was admitted to our center due to severe dyspnea with accompanying chest pain. Echocardiography revealed severe AS (aortic valve area [AVA] 0.5 cm² and a mean pressure gradient 77 mm Hg with mildly reduced left ventricular ejection fraction [LVEF] 48%) (Figure 1A). Coronary angiography showed MVD, with chronic total occlusion of right coronary artery (RCA), critical LM stenosis, left anterior descending artery (LAD), and ostial circumflex (LCx) (Figure 1B). Calculated Syntax Score I was 33 points, 4-year mortality based on Syntax Score II was 11.3% for (PCI) and 3.9% for coronary artery bypass grafting (CABG). Fluoroscopy showed extensive calcifications in the ascending aorta, recognized by computed tomography as porcelain aorta (Figure 1A). The patient was presumed as a low risk for surgical valve replacement (logistic EuroScore II 2.2% and STS score 2.1%) and his case was discussed with the Heart Team. Multiple treatment options have been considered but due to the presence of porcelain aorta, classic surgery has not been recommended. Due to very recent circulatory decompensation, the patient was scheduled for balloon aortic valvuloplasty (BAV) as the first step of treatment. The problem remained with coronary revascularization. Percutaneous revascularization in MVD involving LM is associated with a very high risk of failure, especially in the case of chronic occlusion of the RCA. Similar concerns remained with TAVI. Due to the aforementioned circumstances, a hybrid approach was proposed, including minimally invasive coronary artery bypass (MIDCAB) LAD before TAVI, and afterwards percutaneous revascularization of LM/LCx. Balloon aortic valvuloplasty, complicated with successfully managed ventricular fibrillation, was performed during index hospital stay with VACS II 20 mm (Osypka AG, Rheinfelden, Germany) with a mean pressure gradient drop to 30 mm Hg. Two months later a successful MIDCAB-LAD was performed (Figure 1C). In the next step, the TAVI procedure with a self-expandable Portico 25 mm valve (Abbott, Santa Clara, CA, USA) was performed with the use of commissural alignment technique and without pacing (Figure 1C). Finally, during the same hospital stay, we confirmed patency of the left internal mammary artery LAD graft, and a PCI of LM/Cx was performed via transradial approach with a 7 F Judkins left
3.5 guiding catheter (Launcher, Medtronic, Minneapolis, MN, USA) (Figure 1D–F). Due to the presence of self-expandable aortic bioprosthesis, PCI was much more challenging, but not impossible with the support of a guide extension device (Guideliner, Teleflex, Wayne, NJ, USA) (Figure 1E). Two drug eluting stents (DES) were implanted (2.75 × 48 mm and 3.5 × 18 mm) under intravascular ultrasound guidance (Figure 1F). No complications occurred during each hospital stay and in the 6-month follow-up.

Porcelain aorta presents potential problems for surgery in low-risk surgery patients. The combination of hybrid procedures: TAVI, off-pump CABG, or percutaneous revascularization are valuable and promising methods for the treatment of severe AS and CAD. Moreover, currently there is an ongoing discussion about the necessity and timing of myocardial revascularization before TAVI, even after a coronary physiology assessment confirming ischemia [5].

**Article information**

**Conflict of interests:** None declared.

**Open access:** This article is available in open access under Creative Common Attribution-No Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) license, allowing to download articles and share them with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially. For commercial use, please contact the journal office at kardiologiapolska@ptkardio.pl.


**REFERENCES**


