

**Figure 4.** Twelve-lead ECG recorded with correctly-placed ECG electrodes, revealing sinus rhythm with a different morphology of the P wave and QRS complexes compared with Figure 3, with positive P waves in leads II, III, and aVF; positive in leads I and aVL; left axis deviation; right bundle branch block

**Informed consent:** Informed consent was obtained from the patient prior to the creation of the manuscript.

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## Acute left main coronary artery occlusion following transcatheter aortic valve replacement without obvious risk factors of coronary obstruction

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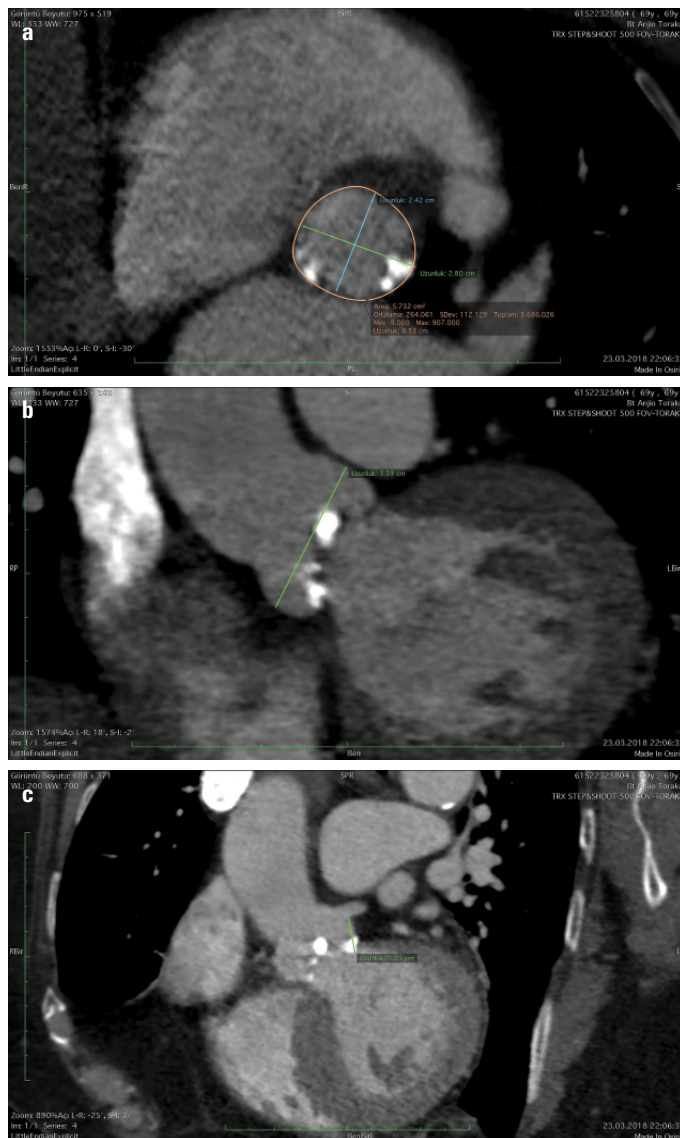
## Introduction

Transcatheter aortic valve implantation (TAVI) has emerged as a prominent alternative for patients with severe aortic stenosis, who are deemed to be at a greater risk for surgical interventions (1). However, extreme caution is recommended against the lethal complications, such as coronary obstruction (CO) or annulus rupture, associated with this procedure that need to be overcome urgently (1). Herein, we report an occlusion of acute left main coronary artery (LMCA) after TAVI, which was treated with triple stenting, due to immediate stent recoils.

## Case Report

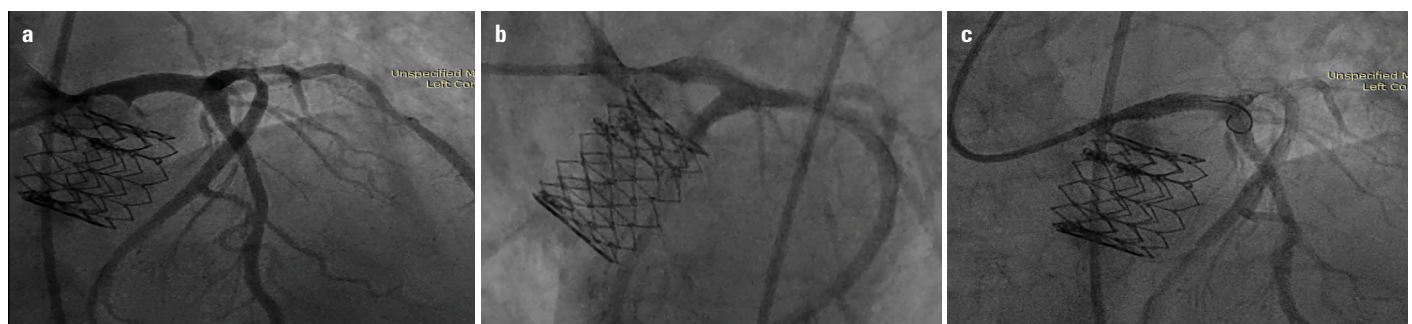
A 79-year-old woman, who was diagnosed with severe aortic stenosis, was referred to our clinic for the evaluation of TAVI. Because she had accompanying diseases including anemia and chronic obstructive pulmonary disease, the heart team concluded that the patient was at a high risk for surgery (a logistic

EuroSCORE of 25.7%, an STS score of 14.6%, and a EuroSCORE II of 8.1%); therefore, TAVI was scheduled.



**Figure 1.** Computed tomography images before transcatheter aortic valve implantation; (a) An annulus size of 24.2/28 mm and an annulus area of 573 mm<sup>2</sup>; (b) Height of left main coronary artery: 13.5 mm; (c) Diameter of sinus of Valsalva: 36 mm

Contrast-enhanced computed tomography (CT) showed an aortic annulus size of 24.2/28 mm, an annular area of 573 mm<sup>2</sup>, the diameter of sinus of Valsalva to be 36 mm, and the height of LMCA to be 13.5 mm (Fig. 1a-1c). The heart team planned combined percutaneous coronary intervention (PCI) of critical (90%) proximal left anterior descending (LAD) lesion and TAVI as a single session for reducing the patient's suffering and the length of hospital stay. First, the team performed stenting of proximal LAD with 3×23 mm Xience Pro (Abbott Vascular), followed by 25-mm balloon predilatation and a successful deployment of 29-mm Edwards Sapien XT valve (Edwards Lifesciences, CA, USA). Although the displacement of bulky calcification toward LMCA was observed during the balloon predilatation (Video 1), initially at least, the LMCA flow appeared to be normal during aortography despite the fact that the mass was completely in front of the takeoff of the LMCA (Video 2). During the process of suturing with Proglide, the patient was extremely hypotensive (50/30 mm Hg) and further showed ventricular fibrillation. Following that, successful cardiopulmonary resuscitation was achieved in less than 20 minutes. Angiography revealed the case of LMCA ostial calcific obstruction (Video 3). Given the fact that the ostium of LMCA was above the Sapien XT frame struts, 6 F EBU 3.5 guide catheter was engaged easily and Pt 2 wire was passed through the lesion. A 4.0×18 mm everolimus-eluting stent was implanted in LMCA and postdilated at a high pressure with 4.0- and 4.5-mm non-compliant (NC) balloons (Fig. 2a, Video 4). Because acute stent recoil occurred due to calcified bulky leaflet, 4.5×15-mm bare metal stent was deployed in LMCA. Repeated high pressure up to 26 Atm in 4.5-mm NC balloon dilatations resulted into good stent apposition followed by persistent stent compression (Fig. 2b). In order to achieve a good radial expansion force, 4.0×20 mm graft stent (PK Papyrus; Biotronik, Bülach, Switzerland) was implanted within the previous two stents and expanded at a high pressure with a NC balloon. A final angiography still revealed fully unexpanded stents in the ostial LMCA caused by heavy calcification (Fig. 2c, Video 5) with better coronary blood flow. The patient was transferred to the intensive care unit. She showed a promising recovery and was discharged under the treatment of ticagrelor and aspirin on the fifth day after the TAVI procedure.



**Figure 2.** (a) Heavy calcification compressing stent; (b) Stent recoil was observed after the second stent, (c) Final image after the graft stent within two stents

## Discussion

The common complications that can occur during TAVI are vascular access complications, aortic root rupture, paravalvular regurgitation, the need for a permanent pacemaker, and coronary obstruction (2). Coronary occlusion has a low incidence rate of about 1%; however, a 30-day mortality rate of 40.6% was reported at its occurrence (3).

Two possible explanations for CO were provided: the displacement of the calcification from the native valve, which is more common, and the obstruction of the coronary ostium by a portion of the transcatheter valve frame (4). Ribeiro et al. (5) identified low coronary ostial height (<12 mm), sinus of valsalva diameter of below 30 mm, female gender, older age, balloon expandable valve, and valve-in-valve procedures as the most important predictors of risk of CO. Although the abovementioned factors are logical for the prediction of CO, none of them were present in our case, thereby suggesting that there is a lot to explore about CO. In addition, the relationship between the LMCA and the "new place" of the bulky calcification is very essential. On the event of any disturbing relationship, repeat aortography can be performed after waiting for a while before finishing the procedure.

There was a higher mortality rate, even after successful stenting (22%) or CABG (50%), which increased to as much as 100% in case of unsuccessful PCI (4). Some researchers suggest the implantation of a second stent when the first stent is not sufficient due to extrinsic compression (6).

## Conclusion

As shown in our case, coronary occlusion during TAVI is not always predictable. Once CO takes place, the deployment of one stent along with multiple balloon dilatations could not prevent the stent compression. Therefore, we suggest the use of a second or even a third stent with a greater radial force to improve the stent expansion, if needed.

**Informed consent:** Written informed consent was obtained from this patient.

**Video 1.** Balloon predilatation. Notice displacement of the calcification towards LMCA take-off

**Video 2.** Aortography after TAVI. LMCA had normal blood flow despite the existence of calcification adjacent to the LMCA.

**Video 3.** Angiography following successful resuscitation. Heavy calcification caused occlusion of the LMCA.

**Video 4.** LMCA was stented with 4.0\*18 mm everolimus-eluting stent. Stent recoil in the setting of bulky calcification was still persisted after multiple post-dilatations.

**Video 5.** Better stent expansion with good coronary blood flow was maintained after triple stenting.

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## Successful percutaneous treatment of pulsatile tinnitus, a rare symptom of carotid artery stenosis

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## Introduction

Carotid artery stenosis is one of the primary reasons of cerebrovascular events. Additionally, carotid artery stenosis can lead to dizziness, imbalance, and sudden severe headaches. Furthermore, a rare and noteworthy symptom of carotid artery stenosis is pulsatile tinnitus (1, 2). The purpose of this case report is to