



Two-step approach to avoid obstruction of the coronary ostium during transcatheter aortic valve implantation with the SAPIEN 3

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Coronary obstruction during transcatheter aortic valve implantation (TAVI) is a rare complication, but it can be serious and is associated with a high mortality rate. This adverse event can be related to procedural factors or anatomic features [1]. Most commonly, the left main coronary artery is involved; however, obstruction of the ostium of the right coronary artery (RCA) might occur if a calcified leaflet is displaced over the ostium [2, 3]. In this case report, we describe a patient who had RCA obstruction during TAVI. The case was a 90-year-old female with symptomatic critical aortic stenosis (peak velocity of 5.9 m/s, aortic valve area of 0.35 cm² and a mean gradient of 88 mmHg), a reduced left ventricular ejection fraction (42%), no significant coronary artery disease and a Society of Thoracic Surgeons score of 7.3%. The following measurements were obtained from preoperative computed tomography (CT): aortic valve annulus diameters of 26 mm (major) and 20 mm (minor); leaflet lengths of 11.2 mm (right), 11.2 mm (non-coronary) and 13.7 mm (left); very small sinus of valsalva (SOV) diameter (23 mm) (Fig. 1b) for the RCA and 27.4 mm for the left coronary; and severe bulky calcification (Fig. 1a, c, d) at the edge of the right coronary cusp. The ratio of leaflet length/coronary height at the right coronary cusp was 0.99. We used a 2-step approach to protect the RCA, because of the bulky calcified leaflet at the right coronary cusp and the small SOV. As the first step, we inserted a wire and balloon to the mid-portion of the RCA (Fig. 1e) before balloon aortic valvuloplasty (BAV) with a 20-mm balloon. After that, we performed balloon dilatation at the ostium of the RCA. Fortunately, cusp blockage was not observed immediately after balloon deflation. The first step may not necessarily be needed in all cases. However, we are concerned about cusp blockage after valvuloplasty. Only wire and/or balloon protection might be needed and not balloon dilatation.

As the second step, we performed stent-set up (Fig. 1f) before TAVI with a 23-mm SAPIEN 3 (Edwards Lifesciences, Irvine, CA, USA). Immediately after valve deployment, there were no ST-segment changes; however, she had ventricular fibrillation that required two defibrillation shocks. A repeat aortogram showed no flow in the RCA secondary to ostial occlusion (Fig. 1g). Percutaneous coronary intervention (PCI) was performed immediately at the ostium of the RCA using the set-up stent with high radial force (BMX-J 3.5 × 18 mm, Terumo, Tokyo, Japan) (Fig. 1h), and the obstruction was eliminated. We performed CT on postoperative day 9, and it showed that the bulky calcification (dotted red circle) between the coronary stent and THV (blue asterisks) was sealed (Fig. 1i). Blue arrow indicates the site of coronary ostium. She was discharged 14 days after the procedure. At 1 year of follow-up, the patient had no symptoms of ischemia, and her functional status and cardiac performance had improved significantly. In conclusion, in this case at very high risk of coronary obstruction, coronary protection using a 2-step approach was helpful and effective to avoid a catastrophic complication.

Compliance with ethical standards

Conflict of interest No author has a conflict of interest to declare.

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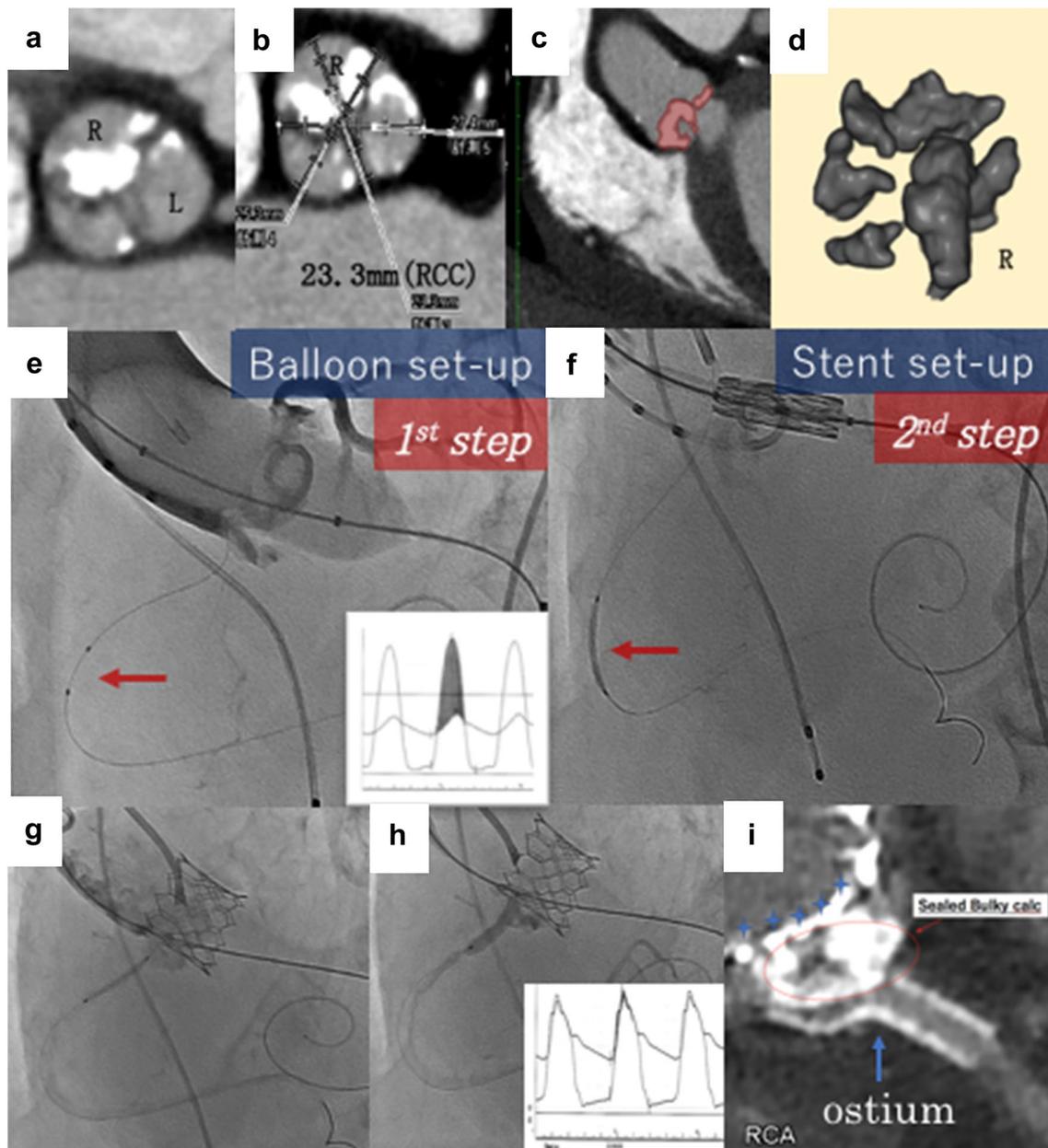


Fig. 1 We performed transfemoral TAVI under conscious sedation. CT demonstrated severe bulky calcification (**a**, **c**, **d**) at the edge of the right coronary cusp. The diameter of the sinus of Valsalva was very small (**b**). As the first step, we inserted the wire and balloon to the mid-portion of the RCA (**e**). Then, as the second step, we performed stent set-up before THVI (**f**). A repeat aortogram showed no

flow in the RCA secondary to ostial occlusion (**g**). PCI at the ostium of the RCA was performed immediately using the set-up stent (**h**). CT on postoperative day 9 showed that the bulky calcification (dotted red circle) between the coronary stent and THV (blue asterisks) was sealed (**i**)