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IMAGES IN CARDIOVASCULAR INTERVENTION

# The kissing balloon inflation technique improved the residual pressure gradient after transcatheter self-expandable valve implantation and chimney stenting in patients with Type-0 bicuspid severe aortic stenosis

**Tomoaki Kobayashi[1] · Kensuke Takagi[1] · Takashi Kakuta[2] · Teruo Noguchi[1]**

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A 65-year-old woman presented with severe chest pain due to severe bicuspid aortic valve stenosis. Transthoracic echocardiography indicated very severe AS with an area of 0.34 $cm^2$ and a mean pressure gradient of 132 mmHg. Multidetector computed tomography scan (MDCT) revealed annular area and perimeter measurements, which were 372 $mm^2$ and 69.0 mm, respectively. The height of the right coronary artery (RCA) was 13.6 mm and shorter than the length of the bulky calcific leaflet, indicating a potential risk of coronary occlusion (Fig. 1A–D). However, because the patient became hemodynamically unstable with ischemic ECG changes due to COVID-19 infection, emergency intra-aortic balloon pump implantation was indicated, and emergency TAVR was performed.

Angiography performed at the same time revealed an 18-mm balloon moved the valve leaflet toward the RCA orifice, resulting in RCA occlusion (Fig. 1E–G). As expected, the RCA was occluded, ECG showed ST depression, and angiography showed coronary flow delay when a 26-mm self-expandable THV opened. (Fig. 1H, I) Therefore, the first 4.0 × 28.0 mm everolimus-eluting stent (EES) was "chimney" out, and then the guiding catheter entered the stent distal end (Fig. 1J, K). As the mean aortic valve pressure gradient (m-AVPG) showed a mean pressure range of 43 mmHg, post-dilatation with "kissing balloon inflation (KBI)" was performed using 18-mm and 4.0 × 12 mm balloons (Fig. 1L). A second 4.0 × 18.0 mm EES was implanted at the position where the completely deformed stent was covered to obtain further radial strength of the stent scaffolding (Fig. 1M). Intravascular ultrasound confirmed optimal stent expansion (Fig. 1N–P). Angiography showed good coronary flow in the RCA, and m-AVPG improved to 20 mmHg (Fig. 1Q, R). At the 6-month follow-up, coronary CT showed good stent expansion and flow in the RCA (Fig. 1S and S1–3).

Chimney stenting is an effective bailout technique to prevent coronary occlusion by a shifted congenital valve. However, when a pressure gradient remains after valve implantation and additional valvuloplasty is required, there is a concern that the stent may deform. KBI is essential to prevent stent deformation in such a situation [1]. In this case, KBI prevented stent deformation and secured the remaining route, which allowed the patient to complete the TAVI procedure.

✉ Kensuke Takagi
takagi.kensuke@ncvc.go.jp

[1] Department of Cardiovascular Medicine, National Cerebral and Cardiovascular Center, Osaka, 6-1 Kishibe-Shimmachi, Suita, Osaka 564-8565, Japan

[2] Department of Cardiac Surgery, National Cerebral and Cardiovascular Center, Osaka, Japan

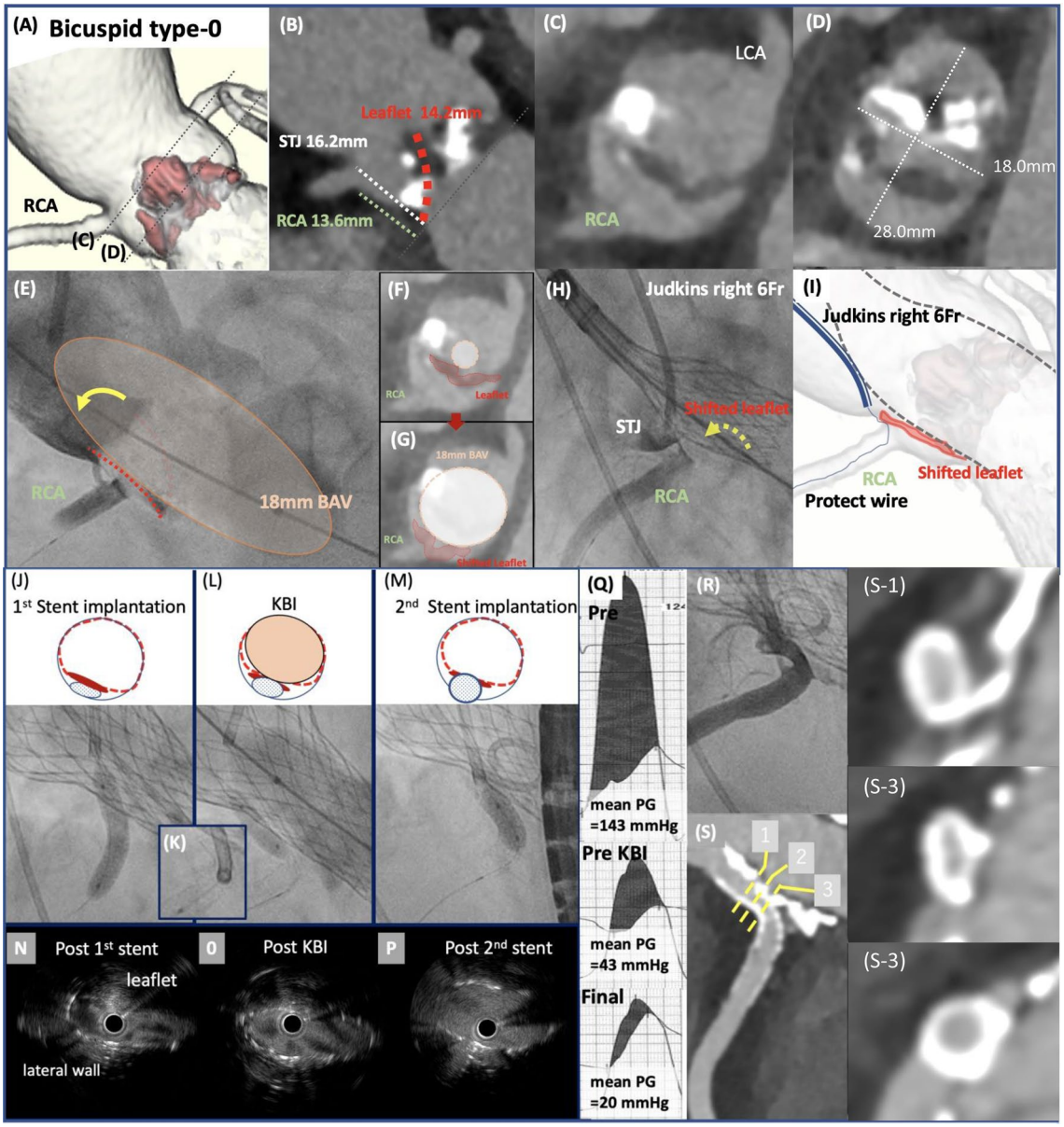


**Fig. 1** Anatomical constraints and images detailing the steps. **A**–**D** Multidetector computed tomography scan (MDCT) showing the coronary height, leaflet length, and the bulky calcific leaflet. **E** Valvuloplasty. **F**, **G** Diagram of the coronary occlusion mechanism. **H**, **I** Angiogram and diagram during valve implantation. **J**–**P** Angiogram, diagrams, and intravascular ultrasound images detailing the steps taken after valve implantation. **K** The key technique of second stent delivery with guide deep engagement. (Q) Preoperative, pre-KBI, and post-TAVR simultaneous pressure measurements. **R** Final angiogram. **S** and **S1-3** MDCT at 6-month follow-up

**Data availability** Third-party was not permitted to use the data.



## Reference

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