

# The transcatheter aortic valve implantation using J-Valve in an elder patient with severe aortic regurgitation and type III endoleak after thoracic endovascular aortic repair

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## Abstract

We first report a successful transcatheter aortic valve implantation using J-Valve system in an elder patient with high-risk pure aortic regurgitation (PAR) and type III endoleak after thoracic endovascular aortic repair (TEVAR).

## CASE

An 83-year old male had symptomatic severe PAR New York Heart Association Functional Classification IV with a type III endoleak was recognized 4 years after TEVAR. A multislice spiral computed tomographic (MDCT) scan revealed a slightly dilation aortic root and ascending aorta without any calcification of the aortic valvular cusps. MDCT-scan showed an annulus perimeter of 86.6 mm and effective diameter of 27.6 mm. The examination also revealed excessive type III endoleak due to disconnection of proximal stent graft segments in the upper TAA(**Figure 1A-C**). The STS risk score revealed an excessive perioperative mortality risk of 19.1%. The complex anatomy, lack of calcification landmarks and the block of stainless steel stent-graft at the intraoperative fluoroscopy angiogram were the challenges during the TAVR procedure.

The patient was qualified for endovascular treatment of type III endoleak due to high risk of aneurysmal sac rupture. After initial angiography to determine the location of the endoleak. The low profile Valiant Thoracic Stent Graft was delivered with a tight guidewire. The inserted segment successfully sealed the rupture thoracic graft(**Figure 2A-C and Movie S1**). Transoesophageal echocardiogram (TEE) and angiography were used for evaluation of the valve movement and function (**Figure 2 D and Figure 3A-C**). An incision of 3 cm in the corresponding costal space and then the apical puncture was done and a super-stiff guidewire was placed in position. A 29 mm J-Valve was directly inserted into the annulus with the aid of the specifically designed delivery system. The delivery system was bluntly inserted into the left ventricle through the apex and advanced into a supra-annular position under fluoroscopic guidance. While the stainless stent-graft effect on visual of operation, the three claspers were completely deployed and were pulled down to make sure the claspers being inside the aortic sinus. The implantation process was consisted of two steps, in the first step, the clasper was positioned into the aortic sinuses correctly. In the second step, the valve was lowed back gently into the annular plan with the guidance of the claspers embracing the native leaflets and deployed. A repeat aortic root angiography revealed no aortic insufficiency (AI) and no paravalvular leak (PVL).(**Figure 2 E/E'-H/H' and Movie S2**). TEE was also used to confirm the valve function during the procedure and showed normal function of the J-Valve with a mean transaortic pressure gradient (PGmean) of 4 mm Hg and no aortic insufficiency or PVL (**Figure 3D-F**). TTE discharge showed an aortic valve area of 2.6 cm<sup>2</sup> with PGmean of 3 mm Hg and 4 mm Hg at 6 months, no AI. And there were no endoleaks detected during monitoring MDCT scan at 6 months follow-up (**Figure 1D-F**).

## DISCUSSION

TAVR procedure for pure AR remains to be considered as a relative contraindication <sup>1</sup>. To overcome the limitation of current TAVR device, J-Valve<sup>®</sup> was designed to treat patients with PAR, and have demonstrated good early and mid-term outcomes for patients with PAR <sup>2, 3</sup>. In the case, the challenges were not only the valve deployment face with positioning inaccurate and anchoring difficult, but also the effect of stainless steel stent-graft on visual field of operation. The J-Valve<sup>®</sup> has three Anchor Ring, which correspond to the three cusps of native aortic valve and provides proprietary locating and self-alignment feature for the valve and secure the cusps into the valve complex providing additional nonradial fixation of the cusps. Therefore, the advantages of J-Valve<sup>®</sup> system probably feasible for aortic valves when angiography did not provide complete clarity of valve annular position as demonstrated in this case. The strategy of grasping the aortic valve leaflets to treatment pure AR has been reported <sup>4, 5</sup>, but those device lack of self-alignment feature and need angiogram to confirm the correct position.

The use of J-Valve<sup>®</sup> system in the treatment of PAR and the type III endoleak is one option when surgical treatment is not allowed. Proper image guidance dedicated device and TEE be used to confirm valve positioning should be utilized to enable the best results. This case demonstrated that J-Valve implantation may be an option for patients with the effect of stainless steel stent-graft on visual field of operation.

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