

ORIGINAL ARTICLE

Three-dimensional printing-guided coaxiality assessment in transcatheter aortic valve replacement for aortic regurgitation

Supplementary File

Table S1. Comparison of mechanical properties between human and three-dimensional-printed (3DP) model materials and printing costs per patient

Tissue	Human [†]	3DP model [‡]
Tensile strength of aortic tissue (MPa)	2.0	2.4 – 3.1
Elongation at break of aortic tissue (%)	45.0	45 – 55
Tensile strength of aortic leaflet (MPa)	0.6	2.4 – 3.1
Elongation at break of aortic leaflet (%)	30.0	45 – 55
Reconstruction time for each 3DP model		1 h
Printing time for each 3DP model		8 h
Printing expenditure for each 3DP model		200 US dollars

Note: [†]All the 3DP models used in this study were printed using the Stratasys PolyJet 850 multimaterial full-color three-dimensional printer (Stratasys Ltd, USA). The material used for the aortic root tissue was Agilus30 (FLX985).

Table S2. Analysis of three-dimensional printing simulation results

Item	Result
Ideal situation	The three coronary sinuses are equal in size. When the U-shaped positioning keys enter the coronary sinuses, they can be evenly and fully deployed in all three sinuses
General situation	For patients with sinuses of Valsalva of different sizes, the positioning keys are often uneven and stretched in one or more of the coronary sinuses. When this occurs, adjusting the insertion angle can minimize or eliminate the deformation of the U-shaped positioning keys
Special situation	In patients with horizocardia, because of the limited flexibility of the delivery system, when the U-shaped positioning key reaches the bottom of the non-coronary cusp, the positioning key at the left coronary cusp may still be far from the bottom. In this situation, the delivery system can be pre-shaped as a compromise to accommodate the aortic curvature

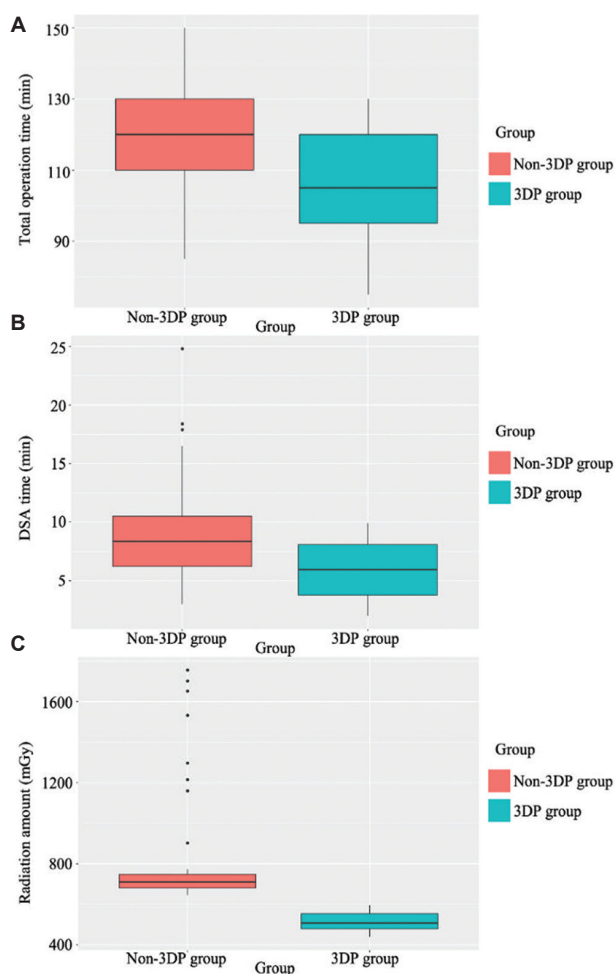


Figure S1. Comparison of total operation time, digital subtracted angiography time, and radiation exposure between the two groups (228 patients in the 3DP group and 384 patients in the non-3DP group). Note: The *p*-value was determined using the paired Student's *t*-test. Abbreviation: 3DP: Three-dimensional printing.

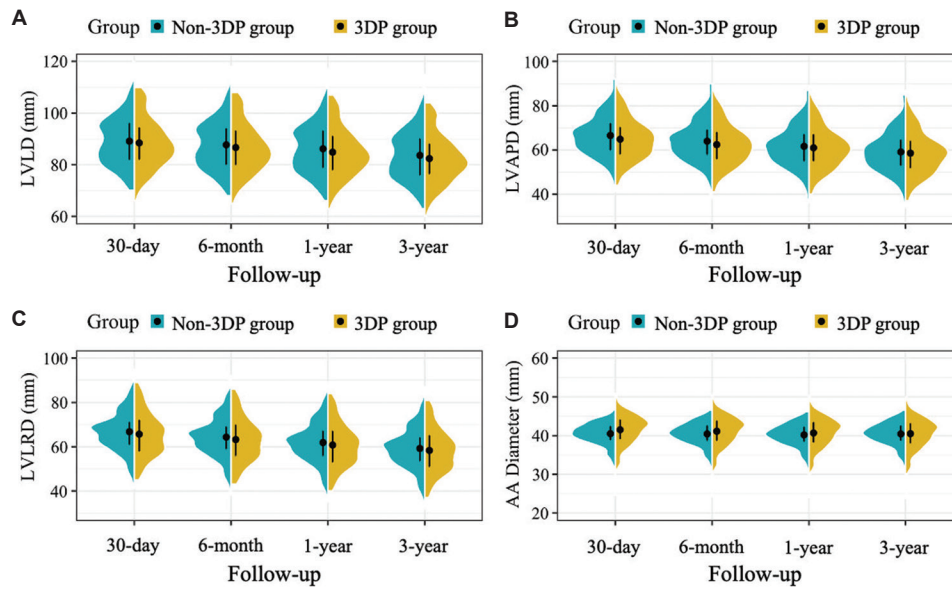


Figure S2. Remodeling of the left ventricle during the 3-year follow-up period compared between the two groups. A total of 228 patients in the 3DP group and 384 patients in the non-3DP group were included in the analysis. (A) Left ventricular longitude diameter; (B) Left ventricular anterior-posterior diameter; (C) Left ventricular left-right diameter; (D) Ascending aorta diameter. Abbreviation: 3DP: Three-dimensional printing.

Reference

1. Rocatello G, Faquir NE, De Santis G, *et al.* Patient-specific computer simulation to elucidate the role of contact pressure in the development of new conduction

abnormalities after catheter-based implantation of a self-expanding aortic valve. *Circ Cardiovasc Interv.* 2018;11:e005344.

doi: 10.1161/CIRCINTERVENTIONS.117.005344