Ongoing Experience With Patient-Specific Computer Simulation of TAVI in Bicuspid Aortic Valve

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Aims
Patient-specific computer simulation of transcatheter aortic valve implantation (TAVI) in bicuspid aortic valve (BAV) has been retrospectively demonstrated to predict the development of both paravalvular regurgitation and conduction disturbance. We sought to describe our ongoing prospective experience with patient-specific computer simulation of TAVI in BAV.

Methods and Results
Between June 2018 and July 2020, patients with BAV who were referred for TAVI prospectively underwent patient-specific computer simulation using FEops HEARTguide technology (FEops, Ghent, Belgium) (Figure 1). The output of the computer simulations was used to guide the optimal treatment strategy for each patient. A total of 19 patients underwent patient-specific computer simulation. BAV morphology was Sievers Type 0 (n=3) and Sievers Type 1 (n=16) (Figure 2). The computer simulations altered the treatment strategy in 16 patients (84%). In five patients, the computer simulations suggested moderate/severe paravalvular regurgitation and these patients were referred for consideration of surgical aortic valve replacement (Figure 3). The remaining 14 patients underwent TAVI with a self-expanding THV. Following review of the computer simulations, 11 of these patients had their planned THV prosthesis size and/or implant depth altered, in order to minimise paravalvular regurgitation and/or conduction disturbance (Figure 4). Following intervention, no patient developed moderate/severe paravalvular regurgitation or required a post-procedural insertion of a permanent pacemaker.

Conclusion
The usage of patient-specific computer simulation of TAVI in BAV to guide treatment decisions was associated with favourable clinical outcomes.