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The role of contact pressure in the development of conduction abnormalities after TAVI: A patient specific computer simulation analysis

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Statement of the Problem: Conduction abnormalities after Transcatheter Aortic Valve Implantation (TAVI) still occur while indications for TAVI expand to younger and lower risk patients. The role of contact pressure generated by the valve frame in the development of conduction abnormalities post TAVI remains unknown.

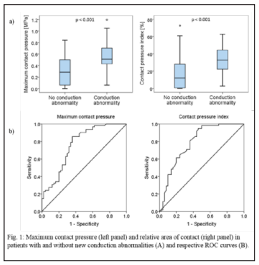

Fig. 1: Maximum contact pressure (left panel) and relative area of contact (right panel) in patients with and without new conduction abnormalities (A) and respective ROC curves (B)

Method: A European multi-center study was conducted including 112 patients with severe aortic valve stenosis who had undergone a pre-procedural CT and was treated by a self-expanding valve. A patient specific region of the aortic root containing the atrioventricular conduction pathway was selected on CT based on the inferior border of the membranous septum. Computer simulation analysis was performed in all cases to quantify contact pressure and contact pressure index (percentage of area subjected to pressure) in the region of interest.

Findings: 62 patients (55%) developed new conduction abnormalities. Maximum contact pressure and contact pressure index (median [IQR]) were significantly higher in patients with new conduction abnormalities (0.51 MPa [0.43-0.70] and (33% [22-44]) compared to patients without (0.29 MPa [0.06-0.50] and 12% [1-28]) (Fig. 1A). Multivariable analysis showed that maximum contact pressure and contact pressure index were independently associated with the occurrence of new conduction abnormalities (p=0.01). By ROC analysis a cut-off value was determined for maximum contact pressure and contact pressure index consisting of respectively 0.39 MPa and 14% (Fig. 1B).

Conclusion: Patient-specific computer simulation showed that maximum contact pressure and contact pressure index was associated with new conduction abnormalities after TAVI. Patient-specific computer simulation may have an added value in TAVI planning.

Biography

Nahid El Faquir is a Research Fellow in Interventional Cardiology at the Erasmus University Medical Center, Rotterdam, Netherlands. She has received her MD degree from the Erasmus University. Her main research interest is interventions in structural heart disease.

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