Transcatheter aortic valve implantation in situs inversus totalis

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Abstract

A frail 84-year old lady with situs inversus totalis and symptomatic aortic stenosis underwent a successful transcatheter aortic valve implantation (TAVI) after extensive diagnostic work-up. We show illustrative pre- and postintervention three-dimensional reconstruction imaging and describe how conventional and dedicated imaging software can support the planning and performance of TAVI.

Keywords: Percutaneous valve implantation · Dextrocardia · Aortic stenosis

INTRODUCTION

Pre-, per- and postprocedural imaging techniques in combination with dedicated computer software programs are increasingly used to plan and guide percutaneous structural heart interventions. These techniques are especially helpful in patients with infrequent anatomical considerations.

CASE REPORT

An 84-year old lady with situs inversus totalis and symptomatic aortic stenosis (mean gradient 75 mmHg; secondary pulmonary hypertension (mean pressure 49 mmHg)) underwent a successful transcatheter aortic valve implantation (TAVI) (26 mm SAPIEN XT, Edwards, Irvine, CA, USA) after extensive diagnostic work-up. Although we first considered a conventional surgical aortic valve replacement in this patient (logistic EuroSCORE 24%, Society of Thoracic Surgeons (STS) score 4.4%), we finally opted for a transfemoral approach due to the frailty of the patient.

Three-dimensional reconstruction of a preoperative cardiac angio-computed tomography (CT) in the anteroposterior and slightly caudal projection showed an inverted (rightward) orientation of the ventricle apex as well as the great vessels (Fig. 1a). A postimplantation aortic angiography (Fig. 1b) confirmed the correct position of the valved stent with the proximal stent edge slightly protruding into the left ventricular outflow tract, thus nicely covering the annulus of the native valve, while still ensuring coronary patency. We repeated the cardiac angio-CT several weeks after TAVI and performed post processing with the dedicated 3mensio Valves software (3mensio Medical Imaging, Bilthoven, Netherlands). Figure 1c showed the position and orientation of the SAPIEN valve in situs inversus. The double-oblique vessel view with volume rendering (Fig. 1d) in a right anterior oblique (26°) and caudal (24°) projection confirmed the exact position of the valve prosthesis at the level of the annulus. During similar postprocessing of preoperative CT images, this orientation had been identified as the optimal work-angle for the valve positioning during TAVI.

DISCUSSION

Extensive patient screening remains one of the key issues in the selection of patients for transcatheter structural heart interventions. More specifically, both the American College of Cardiology/STS and European Society of Cardiology/European Association of Cardiothoracic Surgery advocate, in their position papers, that three-dimensional reconstruction of both the aortoiliac vasculature and aortic valve/root with multislice CT represents an important screening component for TAVI [1, 2]. During the procedure, catheterization laboratory-quality X-ray imaging is ideally supplemented by a variety of alternative imaging modalities, including transoesophageal echocardiography, rotational angiography, CT or even real-time interactive access to magnetic resonance imaging or CT images for real-time three-dimensional reconstruction and ‘road-mapping’ of important structures. We presented a case of transfemoral TAVI in a patient with situs inversus totalis in which post-processing of CT images was particularly helpful to guide the procedure in rare anatomical circumstances. In this case, we opted for a femoral approach to TAVI to minimize the impact of the inverted anatomy on technical procedural skills by simply following the patients’ native aortic orientation with a retrograde approach. However, prosthetic valve orientation and positioning were
greatly improved based on preprocedural image processing and identification of an ideal projection angle for valve deployment.

CONCLUSION

Pre- and postintervention three-dimensional reconstruction imaging with dedicated software programs become increasingly important in planning, performance and follow-up of complex structural heart disease interventions.

Conflict of interest: none declared.

REFERENCES
