The application of cardiac computed tomography to visualize the coronary vein anatomy for implantation of cardiac resynchronization therapy in a patient with a cardiac right-lateral displacement and rotation

Jan Elders*, Mark H.M. Winkens, Erwin S. Zegers, and Leon H.R. Bouwels

1Department of Cardiology B16, Canisius-Wilhelmina Hospital, Weg door Jonkerbos 100, 6523 SZ Nijmegen, The Netherlands and 2Department of Cardiology, Tweesteden Hospital, Tilburg, The Netherlands

* Corresponding author: PO Box 9015, 6500 GS Nijmegen, The Netherlands. Tel: +31 453657926; fax: +31 453658044, Email: j.elders@cwz.nl

A 64-year-old female patient with a history of heart failure, New York Heart Association class III/IV, paroxysmal atrial fibrillation and non-sustained ventricular tachycardia, left ventricular ejection fraction of 12%, and a QRS width of 180 ms qualified for implantation of an implantable cardiac defibrillator with cardiac resynchronization therapy (CRTD). She also underwent surgery for mitral valve replacement a few years ago. In 1964, she had a pneumonectomy due to a hypoplastic right lung which caused a right-lateral displacement and rotation of the heart (Panel A). Previous experiences with coronary angiograms encountered major difficulties as a result of this transposition. In order to glean valuable information preliminary to the implantation, a computerized tomography (CT) of the superior vena cava (SVC), cardiac chambers, and the coronary sinus anatomy was performed.

A three-dimensional (3D) reconstruction of the heart clearly visualized that the coronary sinus had a frontal position and continues to right-lateral (Panel B). Also the suspicion rose that the patient had a persistent left SVC (PLSVC). Pre-implantation a venogram of both the right and left subclavian veins was performed to analyse the venous access to the right atrium and a PLSVC was revealed (Panel C). A CRTD was implanted from the right pectoral side. An atrial screw-in electrode was placed in the right atrium appendage and a shock electrode in the right ventricular apex. Cannulation of the coronary sinus was guided by the 3D CT image. The left ventricle was successfully placed in a (originally) lateral vein (Panel D).

Panel A. Chest X-ray in an anteroposterior view: right-lateral displacement and rotation of the heart due to a pneumonectomy at the right side.

Panel B. Three-dimensional computerized tomographic image of the coronary vein anatomy. Note that the coronary veins are in a frontal position and continuing to right-lateral.

Panel C. Merged image of two flebograms of both subclavian veins revealing a persistent superior vena cava.

Panel D. Right anterior oblique view of the placement of the electrodes. The right ventricle has a posterior position. The left ventricle has an anterior position.