

Poster presentation

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Pre-interventional assessment of the course of the coronary veins in CRT patients

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Introduction

Cardiac resynchronization therapy (CRT) is still limited by the often sub-optimal response of patients in about 30% of the cases. The lack of response can partly be explained by non-optimal left ventricular (LV) lead locations, which are limited by the accessibility through the coronary veins. Knowledge of the course of the coronary veins prior to the intervention may improve patient selection for CRT. It is the intent of this study to investigate the feasibility of whole-heart coronary vein imaging in heart-failure patients scheduled for CRT for pre-interventional identification of lateral vein candidates for LV lead implantation.

Materials and methods

10 non-ischemic HF patients (age: 62 +/- 9[50-71], LVEF: 40 +/- 21[19-79], end-diastolic LV volume: 285 +/- 160[122-605], BMI 26 +/- 4[20.5-31]) scheduled for CRT therapy were enrolled in this study. 8 patients showed mild to medium valve insufficiency in one or more valves. All patients underwent conventional functional MRI comprising CINE acquisitions in short axis geometry and two-, four- and three-chamber long axis geometry. For coronary vein imaging, a whole heart inversion prepared SSFP sequence (TE/TR = 2.4/4.7 ms, free-breathing, inversion time individually optimized) with blood pool contrast agent (CA, Vasovist, Schering, Germany, 0.15 mmol/kg) was performed at end systole. X-ray venograms were obtained subsequently during the implantation procedure.

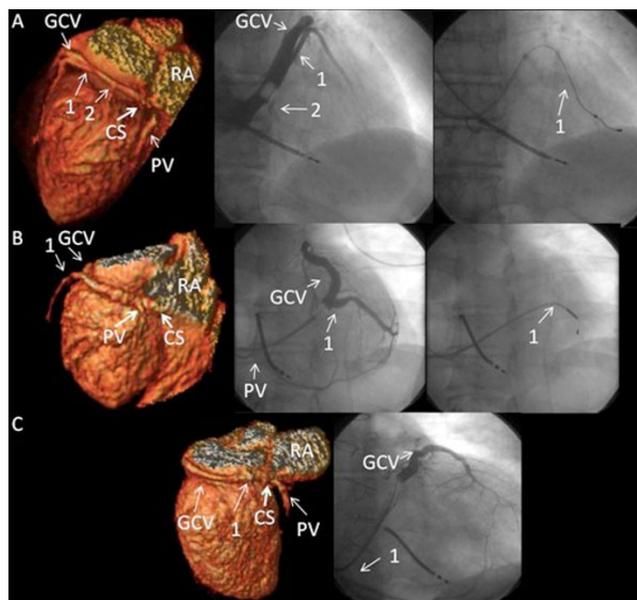


Figure 1
3 patients (rows A, B, C), each with whole heart MRI angiogram (left column), X-ray angiogram (middle) and implanted LV lead (right). GCV = great cardiac vein, PV = posterior vein, CS = coronary sinus, RA = right atrium. Vein bifurcations are marked with numbers. Patient A has 2 bifurcations, where bifurcation I was used for implantation. Patient B has 1 bifurcation used for implantation. Patient C has 1 bifurcation very close to the CS, implantation in this patient was not successful due to lack of a viable lateral branch.

ture by retrograde injection of Iodine CA after balloon occlusion of the coronary sinus.

Results

One patient had to be excluded due to severe arrhythmia. In all other patients, the right atrium, the coronary sinus and its elongation in the great cardiac vein could be visualized with sufficient image quality (Fig. 1). The offspring of the posterior and major lateral veins (if present) could be clearly visualized by MRI. In direct comparison to X-ray, the offspring of all potential lateral vein candidates was visible in the MRI data. However, assessment of the course of the lateral veins was limited by the limited spatial resolution (1.5^3mm^3) of the MRI data.

Summary

The application of MRI for the pre-interventional assessment of the course of the coronary veins appears feasible. Even in the very challenging to image patient cohort of HF patients, MRI could show the presence of potential lateral vein candidates for LV lead placement. However, for accurate pre-interventional identification of the accessibility of the optimal target position on the lateral wall, MRI appears to be still limited by the rather low spatial resolution, which does not yet allow the assessment of the entire course of the lateral veins.

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