1.2mm (postero-lateral branch), angle between CS branch and the main tract were 63.9 ±20 (postero-lateral branch), and angles from CS ostium to CS branch were 26.1 ±15.5° (lateral branch) and 8.1 ±5.6° (postero-lateral branch).

Conclusion: A possibility that Cardiac CT could be helpful to detecting the optimal CS branch in CRT was suggested.

46 Non-invasive visualization of the cardiac venous system using multi-slice computed tomography

M. Jongbloed 1, H.J. Lamb 2, J.J. Bax 3, J.D. Schuitf 3, A. De Roos 2, E.E. Van der Wall 3, M.J. Schalij 3
1Amsterdam, Netherlands; 2Leiden University Medical Center, Radiology, Leiden, Netherlands; 3Leiden University Medical Center, Cardiology, Leiden, Netherlands

Background: during cardiac resynchronisation therapy (CRT), left ventricular (LV) pacing is established by a pacemaker lead in a tributary of the coronary sinus (CS). Knowledge about the CS anatomy and variations may facilitate the implantation of LV leads. The aim of this study was to evaluate the value of multi-slice computed tomography (MSCT) to depict the cardiac venous anatomy.

Methods: MSCT-scans of 38 patients (34 men, age 60±12 years) were studied. Anatomical variants were divided in 3 groups, dependent on the continuity of the cardiac venous system at the crux cords. The CS-ostium and distances between the main tributaries were measured.

Results: the most frequently observed variant had a separate insertion of the CS and the small cardiac vein in the right atrium (24/65% patients). In 11 (29%) patients, there was continuity of the anterior and posterior venous system at the crux cords. In 38% patients, the posterior interventricular vein (PIV) did not connect to the CS. The mean distance from the PIV to the posterior vein of the left ventricle (PVLV) was 42.4±18.1 mm, from the PVLV to the lateral marginal vein (LMV) was 39.3±15.6 mm, and from the LVMV to the anterior interventricular vein 45.4±15.3 mm. The diameter of the CS ostium was 12.6±3.6 mm in anterior-posterior and 15.5±4.5 mm in superior-inferior direction (p<0.01).

Conclusions: the anatomy of the CS and its tributaries can be evaluated using MSCT. As substantial variation in anatomy was observed, pre-implantation knowledge of the venous anatomy may help to decide whether transvenous LV lead placement for CRT is feasible.

47 Coronary venous anatomy and transvenous lead placement at the left ventricular wall

M. Stockburger 1, H. Langreck 2, A. Nitardy 2, W. Haverkamp 2
1Universität des Charite, Med. Klinik m. S. Kardiologie, Berlin, Germany; 2Charité, Humboldt-Universität, Campus Virchow, Cardiology, Berlin, Germany

Purpose: cardiac resynchronisation therapy (CRT) requires the left ventricular (LV) placement of a transvenous or epicardial lead. Transvenous lead placement avoids thoracotomy but it can be difficult due to angulation and tortuosity of the target veins and valves of the coronary sinus (CS). On the other hand ostial angulation and tortuosity can enhance the stability of transvenous leads. The purpose of the study is to investigate the number, angulation and tortuosity of left ventricular lateral veins and the implant success in CRT candidates.

Methods: in 20 patients (10 DCM, 10 CAD, LVEF: 23±6%, 63±8 years) the coronary venous anatomy was documented. In n = 19 a late phase indirect venography after coronary angiography and in n = 19 a retrograde coronary venography was performed. Combining both: n = 18. In the PA and LAO view the lateral venous branches were analysed regarding number, angulation (I°: <90°, II°: 90°-180°, III°: >180°) and tortuosity (3 visually graded degrees).

Results: In 16/20 patients (80%) ≥ 2 veins potentially suited for CRT lead placement were present (3 veins: n = 3, 2 veins n = 13, 1 vein n = 4). In 9/20 a high lateral (HLL), in 17/20 a mid lateral (MLL) and in 14/20 a posterolateral (PL) vein was found. The angulation was III° in 8/39 (20%), II° in 14/39 (36%) and I° in 17/39 (44%) of the veins. In 14/17 ML, 6/8 II°, but only 2/14 PL veins the angulation was ≥ II°. The tortuosity was I° in 9/39 (23%), II° in 17/39 (44%) and III° in 13/39 (33%) veins. Tortuosity ≥ II° was found ML in 16/17, II° in 68 and PL in 8/14. In 19/20 patients (95%) a LV lead could be placed transvenously over a PTCA wire (total implant duration 13±2 min, fluoroscopy 24±12 min). In 5/18 the HLL, in 12/19 the ML and in 2/19 the PL vein was used. In n = 1 with a mid CS vein a dissection occurred without sequelae, in n = 1 a rigid large ostial CS valve made the retrograde cannulation of the CS impossible.

Conclusions: in the majority of CRT candidates ≥ 2 coronary veins are present, which are potentially suited for transvenous lateral lead placement. The majority of these veins originate considerably angulated and have a tortuous course (above all HLL and MLL). Despite strong angulation and tortuosity of the veins a high implant success rate can be achieved, but adequate technology and interventional expertise is required. CS valves in few cases may lead to dissections or can even make CS cannulation impossible.

48 Left ventricular lead placement within a coronary sinus side branch is feasible using remote magnetic navigation of a guidewire

M. Rivero-Ayerza 1, A. Thornton 2, M. Scholten 2, J. Mekel 2, J. Res 2, D. Theuns 2, L. Jordens 2
1Onze Lieve Vrouwe Hospital Aalst, Aalst, Belgium; 2Erasmus Medical Center, Clinical Electrophysiology, Rotterdam, Netherlands

Background: a novel magnetic navigation system (Stereotaxis, St. Louis, MO, USA) has been designed with the purpose of allowing remote guidance of catheters and guide-wires, with the aim of reaching areas or accessing vessels otherwise difficult to get to by conventional means. Objective: this study was conducted with the purpose of:

1. evaluating the feasibility of deploying a LV pacing lead into a desired CS side branch using a magnetically guided wire (Cronus Floppy Endovascular Guide wire, Stereotaxis, St. Louis, MO, USA),
2. testing the feasibility of performing the procedure without the need for a guiding sheath inserted in the CS.

Methods: we included 5 consecutive patients (pts), with an indication for cardiac resynchronization therapy. In patients 1 to 3 the pre-established strategy was to perform the procedure using a guiding sheath to cannulate the CS os. In patients 4 and 5 the decision was to perform the entire procedure without the use of a CS sheath. In these cases a CS image obtained during the late phase of a previous coronary angiography was used as an anatomic guide to navigate and select the target branch. In these last pts the wire was advanced manually while the external magnets oriented it towards the CS os. Once in the CS (in all 5 pts) “vector based” navigation was used to guide the wire to the desired side branch. The wire was advanced distally and on the wire LV pacing lead was introduced.

Results: in all 5 pts the target postero-lateral vessel could be successfully engaged by the magnetically guided wire. In 4 pts the LV lead was lodged in the target vessel. Due to instability, the LV lead was repositioned in an anterolateral side branch in 1 pt. Left ventricular lead properties were: mean sensing amplitude of 18±7 mV, mean pacing threshold of 2.1±1 V and mean impedance of 905±103 ohms. Total procedure and radiography times were 197±60 min and 30±8 min respectively. In one patient phrenic-nerve stimulation threshold was 9 V. One patient required re-intervention due to late LV lead displacement. No major complications were observed.

Conclusion: left ventricular lead implantation can be successfully performed using a remote-magnetically steered guide-wire to engage the desired CS side branch. This procedure could be performed without the need of a CS guiding sheath.