Right Ventricular Venous System in Patients Undergoing Cardiac Resynchronization Therapy. A Rotational Coronary Venous Angiography Study

Dan Blendea MD PhD*, EK Heist MD PhD, Conor D Barrett MD, Mary Orencole NP, Jeremy N Ruskin MD, Jagmeet P Singh MD PhD
Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

Background

- Although the anatomy of the left ventricular coronary venous system has been well described, there are few anatomic and no angiographic descriptions of the right ventricular (RV) venous system.

Aims

- To evaluate the anatomy of the RV venous system

Methods

- 61 patients (age 63±15 years) undergoing cardiac resynchronization therapy
- Rotational coronary venous angiograms (RCVA): rapid isocentric rotation of the camera through a 110° arc (RAO 55° - LAO 55°) in 4 sec while acquiring 120 frames.
- The resulting angiogram enabled a multi-angle review of the entire venous tree.
- The RV veins were seen to fill during the injection of contrast through multiple connections with the left sided venous system in 45 (74%) patients

Results

**Anterior cardiac veins (ACV)**
- Overlay the RV wall
- Observed in 37 (61%) patients
- Diameter of 2.4±0.9 mm.
- Multiple ACVs seen in 21 (34%) patients.
- Emptied directly into:
  - The venous sinus of right atrium (VSRA, 32 pts)
  - Into the right atrium (RA; 4 patients),
  - Or into the small cardiac vein (1 patient)

**VSRA**
- Present in 32 (52%) patients,
- Coursed parallel to the right coronary sulcus, collecting blood from the ACV’s and RMV’s
- Drained into the RA in a shallow angle.
- Length 44±25 mm
- Diameter 3.4±1.2 mm

**Results**

**The right marginal veins (RMV)**
- Visualized in 9 (15%) patients,
- Diameter of 2.7±1.5 mm,
- Course along the right RV border,
- Emptied directly into RA or VSRA.

**VSRA**
- Present in 32 (52%) patients,
- Coursed parallel to the right coronary sulcus, collecting blood from the ACV’s and RMV’s
- Drained into the RA in a shallow angle.
- Length 44±25 mm
- Diameter 3.4±1.2 mm

Conclusions

- RCVA can be used to visualize the RV venous system. The VSRA and its tributaries have anatomical features that would make direct cannulation of the RV coronary venous system technically feasible, facilitating RV epicardial access.

Declaration of interest

D. Blendea: none
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Mary Orencole: none
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Background: Although the anatomy of the left ventricular coronary venous system has been well described, there are few anatomic and no angiographic descriptions of the right ventricular (RV) venous system.

Methods: To evaluate the anatomy of the RV venous system we analyzed rotational coronary venous angiograms (RCVA) obtained from 61 patients (age 63±15 years) undergoing cardiac resynchronization therapy. As contrast was injected into the coronary sinus by balloon occlusion venography, RCVA was obtained by rapid isocentric rotation of the camera through a 110° arc (RAO 55° - LAO 55°) in 4 sec while acquiring 120 frames. The resulting angiogram enabled a multi-angle review of the entire venous tree.

Results: The RV veins were seen to fill during the injection of contrast through multiple connections with the left sided venous system in 45 (74%) patients (Figure). Anterior cardiac veins (ACV), which overlay the RV wall were observed in 37 (61%) patients, and had a diameter of 2.4±0.9 mm. Multiple ACVs were seen in 21 patients. These veins were observed to empty directly into the venous sinus of right atrium (VSRA), into the right atrium (RA), or into the small cardiac vein in 32, 4, and 1 patient respectively. The right marginal vein (RMV) was visualized in 9 (15%) patients, had a diameter of 2.7±1.5 mm, and ran a course along the right RV border, emptying directly into RA or into VSRA. VSRA present in 32 (52%) patients, coursed parallel to the right coronary sulcus, collecting blood from the ACV’s and RMV’s and drained into the RA in a shallow angle. VSRA lengths and diameters varied (44±25 mm and 3.4±1.2mm respectively).

Conclusion: RCVA can be used to visualize the RV venous system. The VSRA and its tributaries have anatomical features that would make direct cannulation of the RV coronary venous system technically feasible, facilitating RV epicardial access.