ACC.14
TCT@ACC-i2 | innovation in intervention

A1124
JACC April 1, 2014
Volume 63, Issue 12

Non Invasive Imaging

3D FUSION OF LV VENOUS ANATOMY ON FLUOROSCOPY VENOGRAMS WITH EPICARDIAL SURFACES ON SPECT MYOCARDIAL PERFUSION IMAGES FOR GUIDING CRT LV LEAD PLACEMENT

Poster Contributions
Hall C
Sunday, March 30, 2014, 9:45 a.m.-10:30 a.m.

Session Title: SPECT Imaging: Focus on Vasodilators, Interpretation and Newer Applications
Abstract Category: 16. Non Invasive Imaging: Nuclear
Presentation Number: 1173-31

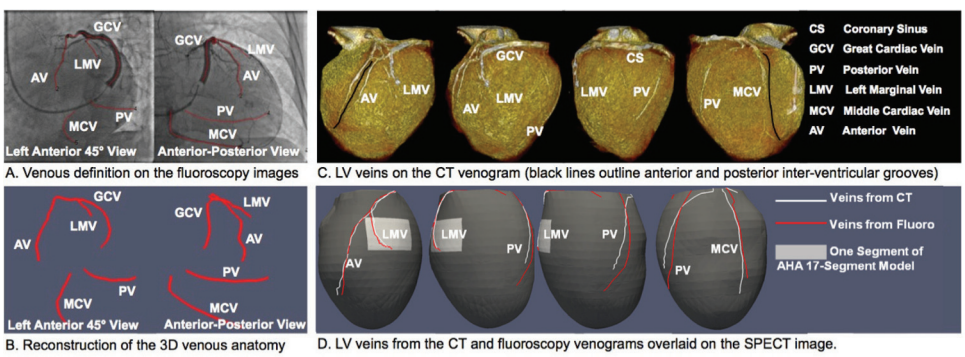
Authors: *Weihua Zhou, Jiangang Zou, Marina Piccinelli, Xiangyang Tang, Lijun Tang, Kejiang Cao, Ernest V. Garcia, Ji Chen, Emory University, Atlanta, GA, USA, Nanjing Medical University, Nanjing, People's Republic of China*

Background: Left ventricular (LV) lead position is important for cardiac resynchronization therapy (CRT) response. To guide LV lead placement into viable regions with late activation, it is important to visualize both LV venous anatomy and myocardium. The objective of this study was to fuse LV venous anatomy on fluoroscopy venograms with LV epicardial surface on SPECT myocardial perfusion images (MPI).

Methods: As shown in the figure, major LV veins were manually identified on the dual-view fluoroscopic venograms (panel A) and then back-projected to form a 3D anatomy (panel B). 3D LV epicardial surface and inter-ventricular grooves were extracted on the SPECT MPI. A 3-step SPECT-vein fusion (geometric alignment, landmark registration, and vessel-surface overlay) was developed to fuse the 3D venous anatomy with the epicardial surface. The accuracy of the SPECT-vein fusion was evaluated using CT venograms (panels C and D). LV epicardial surfaces and veins were manually defined on the CT images and then registered with the SPECT MPI by an operator blinded from the fluoroscopic venograms.

Results: Six CRT patients have been enrolled. The distances between the corresponding fluoroscopic and CT venous segments on the SPECT epicardial surfaces were 4.4±3.3 mm (range: 0-13.4 mm), allowing guided CRT implantation based on the 17-segment model.

Conclusions: A 3D fusion tool has been developed to fuse LV venous anatomy on fluoroscopic venograms with epicardial surface on SPECT MPI for guiding CRT LV lead placement.



A. Venous definition on the fluoroscopy images

C. LV veins on the CT venogram (black lines outline anterior and posterior inter-ventricular grooves)

B. Reconstruction of the 3D venous anatomy

D. LV veins from the CT and fluoroscopy venograms overlaid on the SPECT image.