

Simultaneous assessment of the left atrium and coronary arteries with low-dose axial CT in patients with atrial fibrillation

Poster No.: C-1367

Congress: ECR 2013

Type: Scientific Exhibit

Authors: P. Maurovich-Horvat¹, M. Kolossvary¹, R. D. O'Connor², M. Károlyi¹, G. Széplaki¹, A. Bartykowski¹, L. Geller¹, K. Hüttl¹, B. Merkely¹; ¹Budapest/HU, ²Rotterdam/NL

Keywords: Cardiac, Vascular, CT-Angiography, Diagnostic procedure, Contrast agent-intravenous, Arteriosclerosis

DOI: 10.1594/ecr2013/C-1367

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org

Purpose

Among cardiac arrhythmias atrial fibrillation (AF) is the most common type. The incidence of AF doubles with each decade of age. It is characterized by the presence of irregular, fibrillatory waves on the electrocardiogram, which results in irregular ventricular response. Atrial fibrillation is often associated with coronary artery disease.

Atrial fibrillation (AF) is considered a relative contraindication to coronary CT angiography (CCTA) due to irregular heart rates (HR). Aim of our study was to evaluate image quality (IQ) of the coronaries in patients who underwent prospectively triggered CT angiography to assess the left atrium for electroanatomical mapping and radiofrequency catheter ablation.

Methods and Materials

This was a retrospective, single-center study on image quality in patients with atrial fibrillation who underwent CCTA. Hundred consecutive patients (66 male, 61.3 ± 11.2 years) with AF were examined with a 256-slice CT-scanner (80-140 kV, 200-300 mAs/rot, 0.27s rotation time, $2 \times 128 \times 0.625$ mm collimation, Philips Brilliance iCT) using prospective ECG triggering - "Step-and-shoot" - mode to evaluate left atrial anatomy. Patients were divided into low/medium HR-group [LHR] (mean HR < 80 bpm, n=55) and high HR-group [HHR] (mean HR ≥ 80 bpm, n=45). Coronary segment based IQ assessment was performed using four-point likert-type scale.

Results

In total 1403 coronary segments were analyzed. Mean IQ score was 1.88 ± 1.05 and 88.8% (1246/1403) of segments had diagnostic IQ (49.2% [690/1403] excellent, 25.5% [358/1403] good and 13.3% [186/1403] moderate IQ). The IQ of the LHR-group was better than of the HHR (mean score 1.59 ± 0.89 versus 2.24 ± 1.11 ; $p < 0.0001$). Mean HR of the LHR and HHR group were 68.3 ± 8.7 bpm and 92.7 ± 12.2 bpm ($p < 0.0001$). The HR variation was lower in LHR group than in HHR group (42.5 ± 24.3 versus 55.0 ± 25.1 bpm; $p = 0.014$). Average radiation dose was 4.9 ± 1.6 mSv (range: 0.8-9.5 mSv). Out of 100 patients we identified 22 patients with severe coronary artery disease (CAD), in 13 cases invasive angiography was performed and 7 patients underwent PCI.

Images for this section:

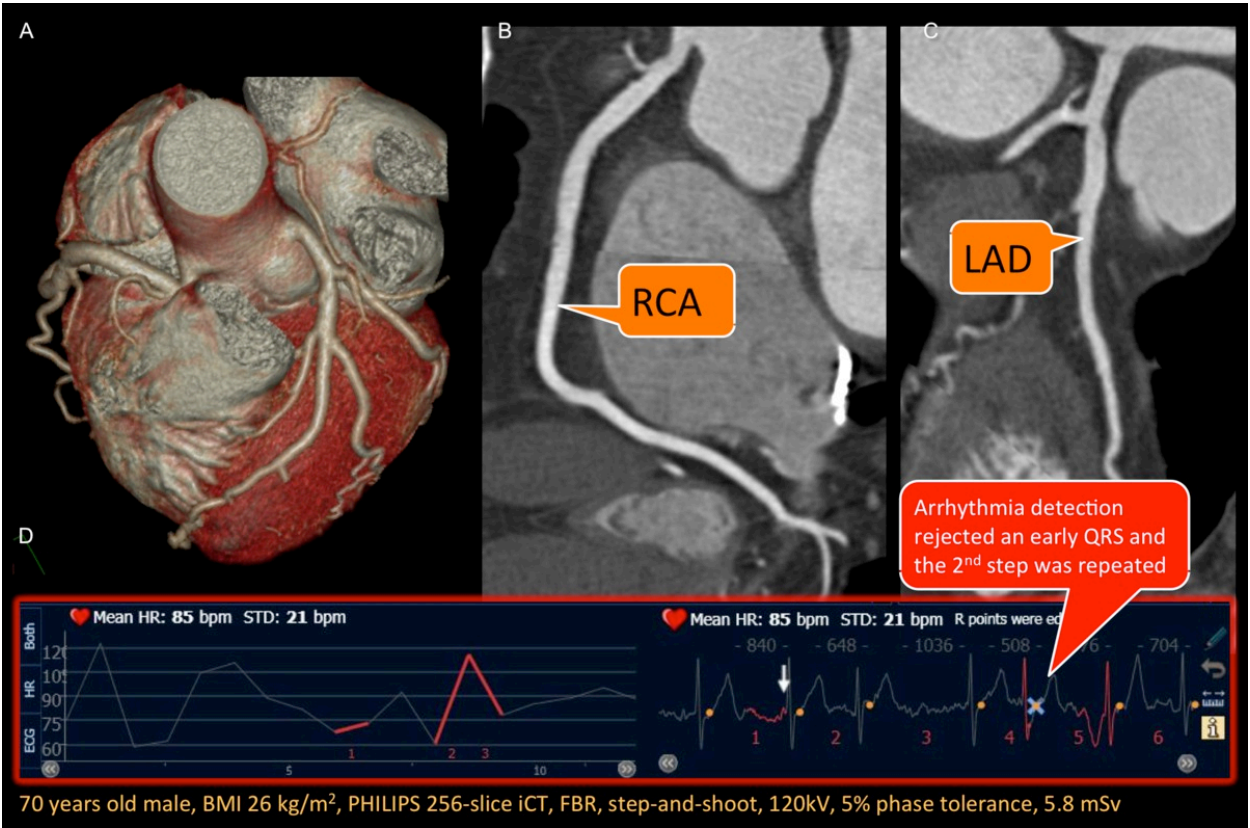


Fig. 1: The of 70 years old male patient who is scheduled to undergo atrial fibrillation ablation. The scan was performed to assess the left atrial anatomy and to rule out significant coronary artery disease. Volume rendered reconstruction shows excellent image quality (Panel A). Curved multiplanar reconstruction of the RCA (panel B) and LAD (panel C). The heart rate graph and the ECG tracing shows that the patient had atrial fibrillation during the CCTA scan.

(1) excellent	49.2% (690/1403)
(2) good	25.5% (358/1403)
(3) moderate	13.3% (186/1403)
(4) non-diagnostic	12.0% (169/1403)

88% (1234/1403) diagnostic image quality

Table 1: Image quality

	LHR Mean HR < 80/perc n=55	HHR Mean HR ≥ 80/perc n=45	p
Mean HR	68.3 ± 8.7/min	92.7 ± 12,2/min	p<0.0001
HR variability	42.5 ± 24.3/min	55.0 ± 25.1/min	p<0.014
Image Quality	1.6 ± 0.9	2.2 ± 1.1	p<0.0001

The average effective radiation dose 4.9 ± 1.6 mSv

Table 2: Comparison of the "low heart rate" (LHR) vs. "high heart rate" (HHR) groups.

Conclusion

Prospectively triggered acquisition mode with 256-slice CT provides diagnostic IQ for coronary evaluation. Simultaneous imaging of the left atrium and coronaries is feasible and provides extra information regarding coronary artery disease in patients who have AF and are scheduled for left atrial ablation procedure. Furthermore, the prospectively triggered CCTA scan mode ensures a low radiation dose even in patients with arrhythmia.

References

Go AS et al.: Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study. JAMA. 2001 May 9;285(18):2370-5.

Lloyd-Jones DM, et al., Lifetime risk for development of atrial fibrillation: the Framingham Heart Study. Circulation, 2004. 110(9): p. 1042-6.

Taylor A et al.: ACCF/SCCT/ACR/AHA/ASE/ASNC/NASCI/SCAI/SCMR 2010 Appropriate Use Criteria for Cardiac Computed Tomography. Circulation. 2010 Nov 23;122(21):e525-55.

Oncel D et al.: Effectiveness of dual-source CT coronary angiography for the evaluation of coronary artery disease in patients with atrial fibrillation: initial experience. Radiology. 2007 Dec;245(3):703-11.

Personal Information