Coronary artery disease burden in patients undergoing RF ablation for atrial fibrillation

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Purpose

To assess the prevalence of coronary artery atherosclerosis in patients undergoing RF ablation for atrial fibrillation.

This is important because:

• Little is known about the prevalence of CAD in patients undergoing RF ablation for AF.

• Knowledge about underlying non-calcified coronary artery disease burden might affect individual treatment.
Methods and Materials

Patient population and Inclusion

Our study had a cross-sectional design with the objective to characterize coronary artery disease burden in patients undergoing RF ablation for AF. A total of 55 consecutive patients (mean age 56 ± 10 yrs; 43 males) referred to Maastricht University Medical Centre between November 2007 and March 2009 for imaging of the heart and pulmonary veins prior to RF pulmonary venous isolation where included in this study to assess coronary calcium scores (CCS) as well as coronary plaque burden.

All imaging protocols were performed using a 64-slice CT scanner (Brilliance 64, Software release v2.4.5.22048, Philips Medical Systems, Best, the Netherlands). All patients were ECG-monitored. Patients were premedicated with 50 mg oral metoprolol 1-2 hours prior to CT scanning. Subsequently, coronary calcium scoring was performed using the Agatston method. At the time of CT scanning these patients had a regular rhythm. All patients underwent coronary CT angiography (CTA) irrespective of the CCS. CCTA was performed using either prospective triggering (i.e. "step and shoot") or retrospective triggering with dose modulation (i.e. "helix technique"). At heartrates of # 65 bpm, CCTA was performed using the step and shoot technique. Patients with heartrates > 65 bpm, received additional intravenous beta-blocker (up to 15 mg). If the heartrate changed to a rate of # 65 bpm, step and shoot was performed. If the heartrate stayed > 65 bpm, CTA was performed using the helix technique.

Image evaluation

Coronary artery luminograms were analyzed using the 16-segment model of the AHA (2). Each coronary artery segment was evaluated for the presence of plaque, and in case there were lesions, the type of plaque. Plaque was defined as any luminal filling defect. The type of plaque was defined as soft or non-calcified plaques (with a density lower than the contrast medium), calcified or mixed (with elements of both non-calcified as calcified plaques). Lesion severity was scored as wall irregularities (<20% luminal narrowing), mild, non-significant plaque (<50% luminal narrowing), moderate plaque (#50% to <70% luminal narrowing), significant plaque (70 to 99% luminal narrowing) or occlusion. In addition, the presence of positive remodeling and myocardial bridging were noted. All scans were evaluated in consensus by a radiologist and a cardiologist. For analysis purposes only the most severe lesion in each segment was recorded.

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Fig. 0: AZM algorithm

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Results

The mean CCS (± SD) in the current cohort was 125 ± 236. In 1 patient (1.8%) images were inconclusive because of significant arrhythmia. 27 patients (49%) had no evidence of coronary artery disease, 1 (1.8%) had mild vessel wall irregularities, 23 (42%) had nonsignificant stenoses in at least 1 segment, and 3 (5.4%) had significant stenoses. 26 patients had 0 calcium score. In 7.7% of patients with 0 CCS, coronary plaque was found despite the absence of calcifications. In 22 (85%) of the 27 patients with stenoses the presence of CAD was not previously documented. In this subgroup the mean CCS (± SD) in the current cohort was 153 ± 241 and 2 patients (9.1%) had significant stenoses.
Images for this section:

**Fig. 0:** AZM algorithm

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**Fig. 0:** Coronary artery disease prevalence

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Conclusion

Limitations

There are several limitations of our study, the most important of which is the absence of a strict a priori inclusion criterium apart from imaging of the heart and pulmonary veins prior to RF pulmonary venous isolation. On the other hand, our population does reflect clinical practice or "real-world experience". Another limitation is the lack of outcome data at present, which makes it presently impossible to link plaque prevalence with adverse cardiovascular and coronary events.

Conclusion

Up to 47.3% of patients undergoing imaging of the heart prior to pulmonary venous RF ablation for AF exhibit signs of coronary artery disease. A zero calcium score in this group does not exclude clinically relevant atherosclerotic coronary artery disease.
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