Coronary artery anomalies, detection by dual-source computed tomography angiography

H.W. Vliegen

In the current issue of the Netherlands Heart Journal, Zhang et al. describe the incidence of anomalous origins of the coronary arteries, demonstrated by dual-source computed tomography angiography (DSCT), in 1879 Chinese adults.¹ The three-dimensional images obtained by DSCT are particularly suited to demonstrate the origin and course of anomalous coronary arteries in relation to adjacent structures, as is clearly demonstrated by the illustrations in Zhang et al.'s paper. This usually allows an accurate and detailed diagnosis which, compared with conventional coronary arteriography, is easier to achieve. Essentially the same results may be obtained by magnetic resonance imaging, a method which, in contrast to DSCT, entails no radiation exposure but lacks the advantage of the short imaging time required for DSCT.²

In the current paper, Zhang et al. found an incidence of 1.3% for anomalous origins of the coronary arteries. Several other well-known congenital anomalies, which are often found in coronary arteriography studies, were not observed. This may be explained by the relatively small study population for these rare anomalies. Nonetheless, the reported incidence is in line with previous studies that used coronary angiographic data and in most cases involved much larger patient populations. The largest series was reported by Yamanaka and Hobbs³ who investigated the coronary angiograms of 126,595 patients and found a total incidence of 1.3% of congenital coronary artery anomalies. However, if in the latter study the presumed innocent anomalies, such as abnormal origin of the circumflex artery (Cx) and separate origins of the left anterior descending artery and Cx in the left sinus, are ex-

cluded, then the prevalence of anomalies drops to 0.56%. These figures are based upon findings in patients who were candidates for coronary arteriography for various reasons but practically never because a congenital coronary artery anomaly was suspected. In almost all cases the demonstration of abnormal coronary arteries was due to serendipity. This is true for most angiographic studies and therefore it is unlikely that the prevalence found is subject to a significant selection bias and the angiographic prevalence is markedly different from the prevalence in the general population. Even combinations of different anomalies have been described.⁴

In contrary to coronary arteriography, CT has been used successfully as a secondary imaging tool in some cases where the right coronary artery could not be located by coronary arteriography.⁵

The mean age of the subjects in the study by Zhang et al. was relatively high, that is 60 years. This may indicate a relatively benign nature of the anomalies that were observed in these individuals.

In a review by Basso et al.⁶ who investigated the clinical profile of coronary anomalies from the opposite aortic sinus with an inter-arterial course, autopsy reports of 27 cases of sudden death were collected. In 23 cases the left main coronary artery (LCA) originated in the right sinus, and in four cases the right coronary artery (RCA) originated in the left sinus. Each case was characterised by an acute angled take-off of the anomalous coronary artery in conjunction with a slit-like lumen at its point of origin from the wrong sinus. Zhang et al.¹ found 12 RCAs arising from the left sinus, and only one LCA arising from the right sinus. Conceivably, as suggested by the study by Basso et al.⁶ and others, an LCA originating in the opposite sinus has a high early mortality and therefore a relatively low prevalence at older age, whereas an RCA originating in the opposite sinus has a more benign course and thus a higher prevalence at older age. Another explanation might be that the incidence of an RCA from the left sinus is much higher than the incidence of an LCA from the right sinus. In the study

H.W. Vliegen

Leiden University Medical Center, Leiden, the Netherlands

Correspondence to: H.W. Vliegen
Leiden University Medical Center, PO Box 9600, 2300 RC
Leiden, the Netherlands
E-mail: h.w.vliegen@lumc.nl

by Yamanaka and Hobbs, in which the mean age of the patients was 53 years, the incidence of an RCA from the left sinus was 6.3 times higher than the incidence of an LCA from the right sinus.³

Although patients with an RCA from the left sinus may survive until advanced age, in the presence of proven ischaemia, an intramural course of the vessel should be suspected, and surgery is required.^{7,8}

In conclusion, congenital coronary anomalies are rare but of clinical relevance and Zhang et al. have demonstrated that DSCT allows an accurate diagnosis of origin and course of coronary arteries with abnormal origin. However, in spite of its non-invasive nature, at present DSCT is not suitable for routine screening of individuals in whom coronary arteries with abnormal origin present the highest risk, such as in competitive athletes. Hopefully, future technical developments will further reduce the radiation burden and lower the cost of DSCT, which could make it a realistic option for screening of selected groups of individuals. ■

References

- 1 Zhang LJ, Yang GF, Huang W, Zhou CS, Lu GM. Incidence of anomalous origin of coronary artery in 1879 Chinese adults on dual-source CT angiography. *Neth Heart J*. 2010;18:466-70.
- 2 Vliegen HW, Doornbos J, de Roos A, Jukema JW, Bekedam MA, van der Wall EE. Value of fast gradient echo magnetic resonance angiography as an adjunct to coronary arteriography in detecting and confirming the course of clinically significant coronary artery anomalies. *Am J Cardiol*. 1997;79:773-6.
- 3 Yamanaka O, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. *Catheter Cardiovasc Diagnosis*. 1990; 21:28-40.
- 4 van der Velden LB, Bär FW, Meursing BT, Ophuis TJ. A rare combination of coronary anomalies. *Neth Heart J*. 2008;16:387-9.
- 5 Ten Kate GJ, Weustink AC, de Feyter PJ. Coronary artery anomalies detected by MSCT-coronary angiography in the adult. *Neth Heart J*. 2008;16:369-75.
- 6 Basso C, Maron BJ, Corrado D, Thiene G. Clinical profile of congenital coronary artery anomalies with origin from the wrong aortic sinus leading to sudden death in young competitive athletes. *J. Am Coll Cardiol*. 2000;35:1493-501.
- 7 Salm LP, Bax JJ, Dirksen MS, Vliegen HW, Jukema JW, Schalij MJ, et al. Comparison of MSCT and MRA in the evaluation of an anomalous right coronary artery. *J Cardiovasc Magn Reson*. 2003;5:403-5.
- 8 Bekedam MA, Vliegen HW, Doornbos J, et al. Diagnosis and management of anomalous origin of the right coronary artery from the left sinus. *Int J Card Imaging*. 1999;15:253-8.

RACE 3

Sponsored by the WCN, ICIN and the Netherlands Heart Foundation, the Routine versus Aggressive rhythm Control for prevention of Early atrial fibrillation in heart failure (RACE 3) study is currently including patients. Primary aim is to investigate in patients with early atrial fibrillation and mild to moderate early systolic or diastolic heart failure whether an aggressive upstream rhythm control approach, including ACE inhibitors, angiotensin receptor blockers, aldosterone receptor antagonists, statins and cardiac rehabilitation programs, increases persistence of sinus rhythm compared with conventional rhythm control.

We call on new centres to increase inclusion. If you are interested, please contact Isabelle van Gelder (i.c.van.gelder@thorax.umcg.nl).

In the next issue of the Netherlands Heart Journal we will report on the relevance of this study.