SAGE Open Medical Case Reports
Volume 4: 1–3

DOI: 10.1177/2050313X16628729
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A case of anomalous coronary artery origin: The role of computerised tomography

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Abstract

Objective: To illustrate the utility of CT coronary angiography in the assessment of patients with anomalous coronary arteries. **Methods:** A 65-year-old woman who presented with a clinical history of unstable angina was investigated with both computerised tomography and invasive coronary angiography. **Results:** Coronary angiography demonstrated aberrant coronary arteries all arising from separate ostia from the right coronary cusp. Computerised tomography coronary angiography was required to confirm the course of the aberrant coronary arteries in relation to other cardiovascular structures. **Conclusions:** This case illustrates the important role of computerised tomography coronary angiography and that early use might avoid the need for invasive coronary angiography.

Keywords

Cardiovascular, computerised tomography, aberrant coronary artery

Date received: 29 August 2015; accepted: 31 December 2015

Case

A 65-year-old woman presented following two episodes of chest pain at rest which were associated with autonomic features but incompletely relieved by glyceryl trinitrate spray. She reported a 2-month history of exertional chest tightness and dyspnoea and had been given a clinical diagnosis of angina in primary care. She was admitted to hospital with a suspected acute coronary syndrome. Examination and admission blood tests including troponin were within normal limits. However, an electrocardiogram showed non-progressive T-wave inversion in leads V1 to V3. Echocardiogram and chest X-ray were normal. Unstable angina was suspected.

An invasive diagnostic coronary angiogram was performed via the right radial approach. Initial selective angiography of the right coronary artery (RCA) (Figure 1(a)) demonstrated an angiographically normal RCA. However, no left anterior descending (LAD) or circumflex artery (Cx) could be identified arising from the left coronary cusp (Figure 1(b)). Repeat selective angiography of the RCA with a more proximal catheter position clearly demonstrated the LAD and Cx arising from separate ostia in the right coronary cusp (Figure 1(c)–(e)). These were angiographically normal but the proximal route of these aberrant vessels was not clear, and therefore, a computerised tomography (CT) coronary angiogram was performed.

The coronary CT (GE Lightspeed VCT XT – 64-slice scanner) demonstrated an LAD and Cx both arising from the right coronary cusp. The LAD followed an anterior course (Figure 1(f)) although the Cx followed a retroaortic course (posterior to the aorta) (Figure 1(g) and (h)). In this case, it was a low retroaortic course, which is thought to be more benign than a high retroaortic course. Given the patient was 65 years old and the arteries were free of atherosclerotic disease, the patient was reassured and no further treatment was planned.

Discussion

Congenital coronary artery anomalies are uncommon and have a reported incidence of 0.3%–1.3% in patients undergoing coronary angiography.[1,2]

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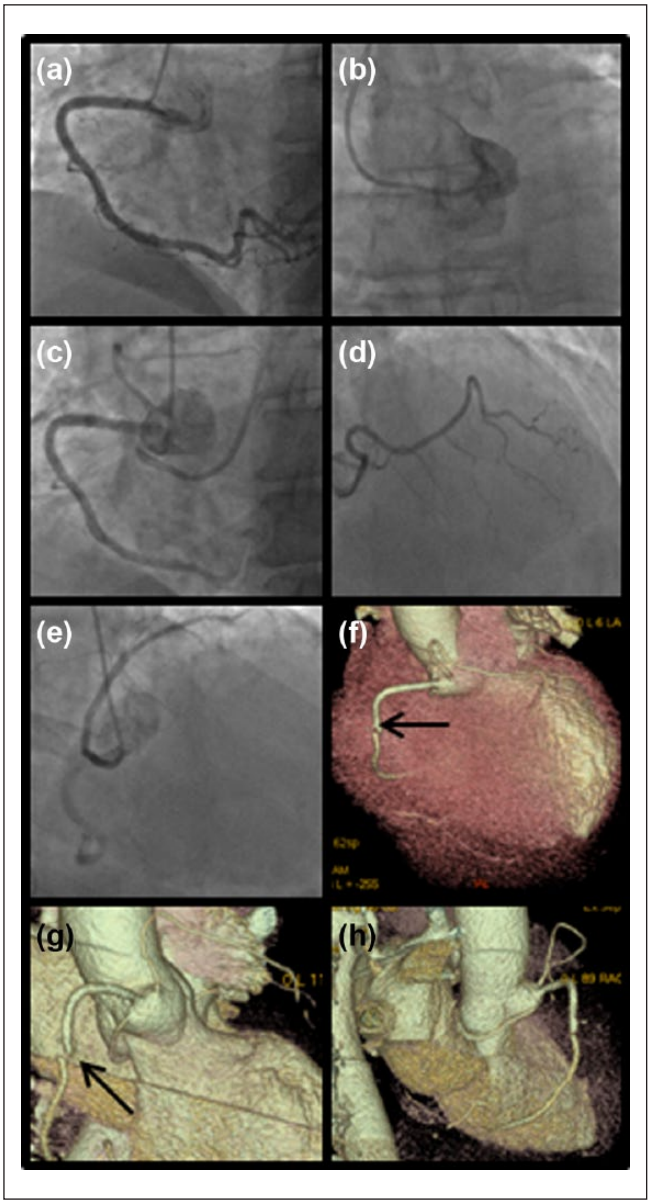

Figure 1. (a–e) Multi-panel figure showing coronary angiograms (CA) (GE Innova 2100) and (f–h) CT coronary angiograms (CTCA) (GE Lightspeed VCT XT – 64-slice scanner): (a) normal right coronary angiogram (RCA), (b) no coronary ostia in left coronary cusp, (c) non-selective angiogram of all three coronary ostia arising from the right coronary cusp, (d) circumflex artery (Cx), (e) left anterior descending (LAD) artery, (f) RCA and LAD on CTCA and (g, h) all three ostia on CTCA demonstrating low aberrant course of Cx on CTCA. Step artefact (arrow).

Classification of coronary anomalies is based on their origin, the course and termination, and also on the degree of haemodynamic instability.[3]

The coronary arteries can arise from the pulmonary arteries, and this can affect the left coronary artery so called ALCAPA (anomalous origin of the left coronary artery from the pulmonary artery) or ARCAPA (anomalous origin of the RCA from the pulmonary artery). ALCAPA is rare and occurs in only 0.26% of patients with congenital heart disease and ARCAPA is even rarer.[1] These rare conditions usually lead to death within a few weeks, unless associated with pulmonary hypertension. Coronary artery anomalies can also co-exist with other congenital heart disease and pulmonary artery agenesis. It is out of the scope of this case report to discuss these in detail but clinicians should be aware to the possibility of multiple co-existing congenital anomalies.

More commonly, congenital coronary artery anomalies relate to variations in the origin and pathway of coronaries from the aorta. This only causes clinical events if the course of the artery is between the aorta and pulmonary trunk and usually manifests itself in young adulthood or when combined with atherosclerotic changes.[1] Thus, the majority of these anomalies are clinically benign and are incidental findings; however, some can manifest with serious morbidity and cardiac-related mortality, which is rare but important, especially in younger patients.[4] Eckart[5] studied 126 non-traumatic sudden deaths in young adults, in whom a cardiac abnormality was discovered in 64 cases (51%), with coronary artery anomalies being the most common cardiac abnormality (61%). An anomalous origin of the left coronary artery arising from the right coronary cusp as in our case occurs in ~0.15% of cases.[2]

There is a lack of robust evidence with regard to the management of these patients, especially if asymptomatic. Treatments range from none, medical therapy to coronary intervention or surgical re-implantation in high-risk cases. This has become an area of interest recently due to the increased use of cardiovascular CT, which has led to a larger number of these anomalies being identified as incidental findings.[6] Furthermore, CT has emerged as the gold standard for identification and characterisation of coronary artery anomalies[7,8] due to the ability to define the course of the arteries in relation to other cardiovascular structures – namely, cardiac chambers and major arteries.

In our case, the patient had two anomalous arteries, the LAD in a benign course and the Cx in a low-risk retroaortic course, which were clearly demonstrated by CT. Furthermore, CT was able to show that the proximal part of this vessel was not intramural and thus of lower risk. Some authors have suggested that intravascular ultrasound (IVUS) is required to fully define the course of the vessel although we would argue that advances in CT coronary angiography make the routine use of IVUS unnecessary.

While CT is the gold standard for identifying anomalous coronary arteries, there remain some limitations on the accurate quantification of luminal stenosis and the assessment of the function significance; in both these aspects, invasive coronary angiography has technical advantages and also gives the opportunity to proceed to intervention with stenting if required at the same time. Furthermore, access to CT for imaging coronary arteries is not easily available in all hospitals. Indeed, even in our institution

where we have a well-established CT coronary angiography service and excellent working relationships between the cardiology and radiology services, an invasive coronary angiography was performed first in this case due to clinical pressures on our radiology department.

Conclusion

Anomalous coronary arteries are an uncommon but important clinical finding. Accurately defining high-risk from low-risk anatomical variant will guide the treatment of patients. Better access to coronary artery CT will likely result in increased awareness and detection of these anomalies and played a critical role in the assessment of this patient. Indeed, in this case, the initial use of CT coronary angiography would have avoided the need for invasive coronary catheterisation, and health care providers should aim to make CT coronary angiography more widely available. While not unique, this rare case illustrated the role that CT has in managing these patients safely.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymised information to be published in this article.

References

1. Michael H. Congenital anomalies of the coronary arteries. *Heart* 2005; 91: 1240–1245.
2. Paolo A. Congenital heart disease for the adult cardiologist. *Circulation* 2007; 115: 1296–1305.
3. Levin DC. Haemodynamically significant primary anomalies of the coronary arteries: angiographic aspects. *Circulation* 1978; 58(1): 25–34.
4. Angelini P. Coronary anomalies: incidence, pathophysiology, and clinical relevance. *Circulation* 2002; 105(20): 2449–2454.
5. Eckart RE. Sudden death in young adults: a 25-year review of autopsies in military recruits. *Ann Intern Med* 2004; 141(11): 829–834.
6. Kacmaz F. Imaging of coronary artery anomalies: the role of multidetector computed tomography. *Coron Artery Dis* 2008; 19(3): 203–209.
7. Fujimoto S. Prevalence of anomalous origin of coronary artery detected by multi-detector computed tomography at one centre. *J Cardiol* 2011; 57(1): 69–76.
8. Schmitt R. Congenital anomalies of the coronary arteries: imaging with contrast-enhanced, multi-detector computed tomography. *Eur Radiol* 2005; 15(5): 1110–1121.