CASE REPORT

Percutaneous coronary intervention in a case of anomalous single coronary artery

Prakash Sadashivappa Surhonne,¹ Srikanth Reddy Mallareddy Bogle,¹ Shivakumar Bhairappa,¹ Anshul Kumar Gupta²

¹Department of Cardiology, Sri Jayadeva Institute of Cardiovascular Sciences & Research, Bangalore, Karnataka, India

²Sri Jayadeva Institute of Cardiovascular Sciences & Research, Bangalore, Karnataka, India

Correspondence to

Dr Anshul Kumar Gupta, dr. anshulkumargupta@gmail.com

Accepted 28 April 2016

SUMMARY

Anomalous origin of the right coronary artery is an uncommon entity with a reported incidence of 0.26%. The anomalous origin is usually from the left sinus of Valsalva. Anomalous origin of the right coronary artery (RCA) from the left anterior descending (LAD) artery is a rare occurrence. Symptomatic patients with associated significant coronary artery disease (CAD) may be treated with routine interventions such as percutaneous coronary intervention or coronary artery bypass surgery. We report a case of single coronary artery with severe proximal LAD stenosis. The RCA had its origin from the mid LAD. Coronary intervention was successfully carried out on the severe stenosis at the proximal LAD artery. These cases are rare. We discuss accurate diagnosis and appropriate management in such cases.

CASE PRESENTATION

A 65-year-old man presented to the emergency room (ER), with typical anginal pain for the past 2 h. He did not have any conventional atherosclerotic risk factors such as smoking, diabetes, hypertension or dyslipidaemia. There was no family history of coronary artery disease (CAD) and he denied history of any illicit drug abuse. Clinical examination was normal. Initial ECG showed ST segment depressions in leads V1-V6 with ST segment elevation in lead aVR. A serial ECG 15 min later showed ST segment elevation in leads II, III and aVF. Thrombolytic therapy was administered with streptokinase, following which the patient improved symptomatically. Echocardiography revealed left ventricle (LV) segmental hypokinesia with mild LV systolic dysfunction (ejection fraction=42%). Cardiac catheterisation later revealed a single coronary artery arising from the ostium of the left coronary sinus. Neither the right coronary sinus nor the non-coronary sinus showed the origin of a coronary artery (video 1). The left anterior descending artery (LAD) and left circumflex coronary artery originated from the left main coronary artery. The RCA had an anomalous origin from the mid LAD (figures 1 and 2; videos 2 and 3). The left main stem was patent, but there was 70% stenosis in the proximal segment of the LAD. The anomalous RCA originating from the mid segment of the LAD was a dominant vessel and had minimal disease in its ostioproximal segment (figure 2). A multislice CT scan was performed to delineate the course of the anomalous vessel. The images demonstrated that the anomalous RCA traversed anterior to the

Video 1 Aortic root angiogram showing absence of origin of RCA from right coronary sinus. RCA, right coronary artery.

main pulmonary artery/right ventricular outflow tract and then took a bend down to the surface of the right ventricle (figure 3). Percutaneous coronary angioplasty was carried out and the proximal LAD lesion was stented with a Sirolimus eluting stent. The final angiographic result revealed good flow to the distal LAD and anomalous RCA (figure 4 and video 4).

Figure 1 Right anterior oblique view with cranial angulation showing anomalous origin of RCA from mid segment of LAD. Proximal LAD shows a critical stenosis. LAD, left anterior descending; LCX, left circumflex coronary artery; RCA, right coronary artery.

To cite: Surhonne PS, Bogle SRM, Bhairappa S, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2016-215651

Figure 2 Left anterior oblique view with cranial angulation showing anomalous origin of RCA from mid LAD. Proximal LAD has a critical stenosis. LAD, left anterior descending; LCX, left circumflex coronary artery; RCA, right coronary artery.

OUTCOME AND FOLLOW-UP

The hospital stay was uneventful. The patient has been under regular follow-up for the past 6 months and is asymptomatic.

DISCUSSION

Coronary artery anomalies are present at birth, but they usually remain asymptomatic and are often detected incidentally during coronary angiography.¹ Prevalence of coronary artery anomalies has been reported as 0.6% to 1.3% in angiographic series and 0.3% in autopsy series.^{1–3} Isolated single coronary artery (SCA) is a rare congenital anomaly and occurs as an incidental finding in ~ 0.066% of the coronary angiography population.⁴ Most coronary anomalies remain asymptomatic. However, myocardial perfusion can be affected, ranging from exertional angina to

Video 2 Right anterior oblique view with caudal angulation showing anomalous origin of RCA from mid part of LAD. Proximal LAD shows significant stenosis. LAD, left anterior descending; RCA, right coronary artery.

Video 3 Left anterior oblique view with cranial angulation showing anomalous origin of RCA from mid LAD. Proximal LAD shows significant stenosis. LAD, left anterior descending; RCA, right coronary artery.

sudden death, within the different subtypes of these anomalies, such as a coronary artery arising from the pulmonary artery and a SCA arising from either the left or right sinus of Valsalva.⁵ The anomalous origin of the RCA arising from the LAD coronary artery, a subgroup of SCA, is relatively rare and more benign than other types of anomalous origins of the RCA.⁶ In a large series of 126 595 coronary angiograms, the prevalence of anomalous RCAs has been reported as 0.26%.² An anomalous RCA may originate from the left sinus of Valsalva, left main coronary artery, thoracic aorta or the pulmonary artery.⁷ The anomalous

Figure 3 Multislice CT reconstruction image showing anomalous origin of RCA from mid part of LAD and coursing in front of pulmonary artery. LAD, left anterior descending; LCX, left circumflex coronary artery; RCA, right coronary artery.

Figure 4 Right anterior oblique view showing end results of successful angioplasty and stenting of proximal LAD lesion, with good distal flow. LAD, left anterior descending; LCX, left circumflex coronary artery.

artery may run in front of the main pulmonary artery, posterior to the aortic trunk or between the aorta and main pulmonary artery. An 'inter-arterial subtype', also called malignant anomaly, is associated with a high risk of myocardial ischaemia and sudden cardiac death. Sudden cardiac death in such cases may be due to repetitive ischaemic episodes causing patchy myocardial necrosis and fibrosis resulting in catastrophic malignant ventricular arrhythmias.⁸ However, when the anomalous artery runs in front of the main pulmonary artery or posterior to the aortic trunk, as seen in our case—it is rarely associated with such dreaded complications. Significant atherosclerotic CAD in association with coronary artery anomalies has been reported in 26–60% of cases.⁹ Symptomatic patients with associated significant CAD may be treated with routine interventions such as

Video 4 Postangioplasty and stenting left coronary angiogram showing good end results with thrombolysis in myocardial infarction (TIMI) III flow in distal LAD and anomalous RCA. LAD, left anterior descending; RCA, right coronary artery.

percutaneous coronary intervention (PCI) or coronary artery bypass grafting.¹⁰

Our patient presented to the ER with acute coronary syndrome. His coronary angiogram revealed a rare occurrence of a SCA with anomalous origin of the RCA from mid LAD and associated with significant atherosclerotic CAD. This congenital anomaly was an incidental finding, since the patient's initial clinical presentation was suggestive of significant coronary obstructive disease of the LAD. The proximal LAD segment had a severe stenosis; therefore blood flow to all distal branches including the anomalous RCA was jeopardised. Coronary flow to the distal LAD and RCA was significantly improved after percutaneous coronary angioplasty and stenting of the proximal LAD lesion. Although coronary artery anomalies are usually diagnosed during cardiac catheterisation, multislice CT may be extremely helpful in diagnosis as it facilitates the exact delineation of the course of the anomalous vessel. The accurate delineation of the course of the anomalous vessel is of great importance even in patients without CAD. In patients for whom surgical or percutaneous intervention is planned, multislice computed tomography (MSCT) assumes importance for confident pre-procedural/surgical planning.

This case represents a rare case of SCA with anomalous origin of the RCA from mid LAD, associated with obstructive CAD. PCI to the severe stenosis at proximal LAD was performed successfully with good end results. Cardiologists and cardiothoracic surgeons should be aware of coronary anomalies that may be associated with potentially serious cardiac events; recognition of these coronary anomalies is mandatory in order to provide the best therapy for each patient according to presentation.

Learning points

- ▶ Coronary artery anomalies are uncommon entities seen in clinical practice.
- ▶ Usually, patients remain asymptomatic, but they can rarely present with acute coronary syndrome, syncope or even sudden cardiac death.
- ▶ Anomalous origin of the right coronary artery (RCA) from the left anterior descending (LAD) artery is a rare anomaly.
- ▶ CT helps define the origin and course of the anomalous vessel.
- ▶ Symptomatic patients can be managed by percutaneous coronary intervention or coronary artery bypass grafting.
- ▶ Awareness of coronary anomalies is important for clinical suspicion and appropriate management of patients.

Acknowledgements The authors would like to thank Professor C N Manjunath for his encouragement and guidance.

Contributors SR and AKG prepared the manuscript. SSP and SB performed the PCI and finalised the manuscript.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Laureti JM, Singh K, Blankenship J. Anomalous coronary arteries: a familial clustering. *Clin Cardiol* 2005;28:488–90.
- 2 Yamanaka O, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. *Cathet Cardiovasc Diagn* 1990;21:28–40.

- 3 Wilkins CE, Betancourt B, Mathur VS, *et al.* Coronary artery anomalies: a review of more than 10,000 patients from the Clayton Cardiovascular Laboratories. *Tex Heart Inst J* 1998;15:166–73.
- 4 Desmet W, Vanhaecke J, Vrolix M, *et al.* Isolated single coronary artery: a review of 50,000 consecutive coronary angiographies. *Eur Heart J* 1992;13:1637–40.
- 5 Kardos A, Babai L, Rudas L, *et al.* Epidemiology of congenital coronary artery anomalies: a coronary arteriography study on a central European population. *Cathet Cardiovasc Diagn* 1997;42:270–5.
- 6 Amasyali B, Kursaklioglu H, Kose S, *et al.* Single coronary artery with anomalous origin of the right coronary artery from the left anterior descending artery with a unique proximal course. *Jpn Heart J* 2004;45:521–5.
- 7 Jammula P, Gupta R, Uretsky BF. Images in cardiology: anomalous origin of the right coronary artery from the left anterior descending artery. *Heart* 2005;91:e30.
- 8 Fineschi V, Maresi E, Di Padua M, *et al.* Sudden cardiac death due to anomalous origin of the right coronary artery: a case report in a child. *Int J Cardiol* 2006;108:426–8.
- 9 Salah AM Said Willem G de Voogt Suat *et al.* Coronary artery disease in congenital single coronary artery in adults: a Dutch case series. *World J Cardiol* 2014;6:196–204.
- 10 Türkay C, Gölbası I, Bayezid O. A single coronary artery from the right sinus of Valsalva associated with atherosclerosis. *Acta Cardiol* 2002;57:377–9.

Copyright 2016 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow