Rare disease

An interesting clinical scenario of patient with acute myocardial infarction with single coronary artery

Shivakumar Bhairappa, Vittal Bagi, Khamitkar Shankar Rao Subramani, Naviluru Madaiah Prasad

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

Correspondence to Dr Shivakumar Bhairappa, shivnb242@yahoo.co.in

Summary

Anomalous origin of the left main coronary artery from the right sinus of valsalva is an extremely rare condition. Right-sided single coronary trunk associated with rudimentary left coronary artery is probably the rarest. The clinical significance of single coronary artery (SCA) depends on its relationship with the great arteries. The causes of myocardial ischaemia in these arteries could be impaired vasodilator response, vascular compression between great arteries or atherosclerosis. We report a 42-year-old gentleman who presented with anterior wall myocardial infarction (MI) and thrombolysed with streptokinase. The coronary angiogram done revealed anomalous right SCA (Lipton type-RII/Yamanaka RIIA) with recanalised left anterior descending artery (LAD). In this case the cause of MI could be atherosclerotic, as this patient responded to thrombolytic therapy and coronary angiogram revealed recanalised LAD. This case highlights the fact that these anomalous arteries are susceptible to atherosclerosis as are normally arising coronary arteries.

BACKGROUND

Rare disease and reminder of important clinical lesson.

CASE PRESENTATION

A 42-year-old gentleman presented to local hospital with the complaints of chest pain of 2 h duration. He was diagnosed as acute anterolateral wall myocardial infarction and thrombolysed with streptokinase (due to financial concerns and patient's choice). Subsequently, he was asymptomatic, haemodynamically stable and had >50% ST segment resolution. He had an uneventful hospital course. He was referred to our comment for postinfarction risk stratification.

ECG at admission showed QS pattern with T-wave inversion in lead I, aVL, V5, V6. Transthoracic ECG showed hypokinesia of anterior and lateral wall with left ventricular ejection fraction of 48%. An elective coronary angiogram was done, and it revealed a small rudimentary coronary artery arising from the left coronary sinus of valsalva and a single coronary artery trunk (SCA) arising from the right sinus of valsalva (RSV). SCA trunk was giving rise to right coronary artery (RCA) and left main coronary artery (LMCA). LMCA was bifurcating into left anterior descending (LAD) and left circumflex coronary arteries (LCX) (figures 1–4). Distal LAD showed non-obstructive atherosclerotic plaque suggestive of recanalised culprit vessel.

A CT coronary angiography (CT coronary angiography) done to assess the anatomical course of the left coronary artery in relation to the great vessels. CT angiography showed an SCA from right coronary sinus giving rise to RCA which has normal course. LMCA arises from the SCA about 17 mm distal to ostium and has prepulmonic course. LMCA gives rise to LAD which enters the anterior interventricular groove. Proximal LCX has a interventricular septal course before it enters the left

atrioventricular groove, mid and distal LCX is hypoplastic.^{1–3} (Lipton type-RII/Yamanaka RIIA). The patient was asymptomatic and discharged on antiplatelet, β -blocker, angiotensin-converting enzyme inhibitor and statin.

DISCUSSION

Anomalous coronary arteries are observed in 1% of the general population. SCA is a rare congenital anomaly of the coronary arteries that occurs in approximately 0.02–0.07% of the population. Anomalous origin of the LMCA from the RSV as an SCA is extremely rare and is reported to constitute 0.019% of angiographic series without associated congenital cardiac anomalies.^{1 2}

Figure 1 Right anterior oblique view of left coronary angiogram showing rudimentary left coronary artery.

Figure 2 Right anterior oblique view of right coronary angiogram showing origin of single coronary artery from right sinus of valsalva.

The clinical significance of an SCA originating from the RSV depends on the course and its relationship with the aorta and the main pulmonary artery. If the anomalous artery runs between these two great vessels, it is frequently associated with angina, syncope or even sudden death.³ On the contrary, if the anomalous coronary artery courses in front of the main pulmonary artery or behind the aortic trunk, it is rarely associated with these complications.⁴

An angiographic classification for SCA was proposed by Lipton *et al* in 1979 and later modified by Yamanaka and Hobbs in 1990. Accordingly, the 'R' (right-type) and the 'L' (left-type) is used as to whether the SCA originates from the right or the left sinus of valsalva. Thereafter, depending on the anatomical course of the artery every case is designated as belonging to group I, II or III. In group I, the artery follows the anatomical course of either a right or a left coronary artery. The group II/III is further classified according to the path followed by the anomalous arteries from one side of the heart to the other: 'A' denotes a path anterior to the great vessels, 'P' denotes a posterior course,

Figure 3 Right anterior oblique view of right coronary angiogram showing course of right coronary artery and left anterior descending.

Figure 4 Right anterior oblique view of right coronary angiogram showing course and distribution of right coronary artery, left anterior descending and left circumflex.

'B' indicates a path between the aorta and the pulmonary artery, and 'S' is used when part of the route is through the interventricular septum. Finally, 'C' stands for a combination of diverse routes.⁵ In our case, anomalous vessel is Lipton type II A.

Although these anomalies are incidentally detected and usually asymptomatic, they may develop angina pectoris, MI, ventricular arrhythmias, syncope and sudden death especially during or after exercise.^{1 2}

Various anomalous coronary arteries causing the myocardial ischaemia are the anomalous origin of left coronary artery from the pulmonary artery, left coronary artery arising from the anterior sinus of valsalva, coronary arteriovenous or arteriocameral fistula and coronary artery aneurysms.

Ischaemia is the consequence of anatomical malformations in the anomalous vessel, including the acute angle take-off, narrowed slit-like orifice that collapses in a valve-like manner, the proximal intramural course which is squeezed within the aortic wall and the compression between the aorta and the pulmonary artery, particularly during exercise.¹⁻⁴ Other hypothetical mechanisms causing symptoms can be related to impaired vasodilator response, a decrease in coronary artery blood flow because of a kinking of the left coronary artery at its origin from the RCA. Kinking may be caused by an increased angulation resulting from distention of the aorta during increased cardiac activity.⁵

Our case presented with myocardial infarction, which has not been described in literature so far. However, in Lipton type IIA many, if not most, pose no inherent threat to the patient, as the course of abnormal coronary artery is anterior to the aorta and consequently the vessel is not exposed to compression by aorta and pulmonary artery during efforts.⁶ Nevertheless, these anomalous arteries are probably as susceptible to atherosclerosis as are the normally arising coronary arteries.⁷ Garg *et al* stated that atherosclerotic plaques in the anomalous arteries were seen in only 33% of the patients, much less than the overall incidence of coronary artery disease in patients with congenital coronary anomalies.⁶ As our patient responded to the

thrombolytic therapy very well, the probable reason for MI would have been the atherosclerotic occlusion of LAD. The risk factors complimenting this being age, hypertension and dyslipidemia. Angiographic evidence of residual plaque in distal LAD supports the diagnosis.

There has been three case reports so far described in literature, of elective coronary angioplasty being performed for myocardial ischaemia in a SCA (one for unstable angina and two for effort angina).⁷ In these cases, percutaneous coronary angioplasty with stent insertion may be a successful therapeutic option; however, accurate morphological identification of anomalous arteries is mandatory before planning these interventions, in order to recognise other possible mechanisms of myocardial ischaemia (eg, vascular compression) and to choose the most appropriate type of pharmacological, percutaneous or surgical intervention. To the best of our knowledge, a patient with rudimentary LCA and single trunk from right coronary sinus (Lipton type IIA) presenting as acute MI had not been described in the literature so far.

Other imaging techniques, like coronary CT or MRI, may be useful in order to correctly identify the origin and course of abnormal coronary arteries.⁸

However, considering the present case scenario, how feasible is it to do a primary percutaneous coronary intervention (PCI)? These anomalous arteries are probably as susceptible to atherosclerosis as the normally arising coronary arteries. In the current era of primary PCI, and increasing prevalence of atherosclerotic coronary artery disease, need to consider the rare possibility of incidentally detected coronary anomaly that may delay the promptness of the intervention.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. Chaitman BR, Lesperance J, Saltiel J, *et al*. Clinical, angiographic, and hemodynamic findings in patients with anomalous origin of the coronary arteries. *Circulation* 1976;**53**:122–31.
2. Yamanaka O, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. *Cathet Cardiovasc Diagn* 1990;**21**:28–40.
3. Benson PA, Lack AR. Anomalous aortic origin of the left coronary artery. *Arch Pathol* 1968;**86**:214–16.
4. Rigatelli G, Rigatelli G. Coronary artery anomalies: what we know and what we have to learn. A proposal for a new clinical classification. *Ital Heart J* 2003;**4**:305–10.
5. Kimbiris D, Iskandrian A, Segal B, *et al*. Anomalous origin of coronary arteries. *Circulation* 1978;**58**:606–15.
6. Garg N, Tewari S, Kapoor A, *et al*. Primary congenital anomalies of the coronary arteries; a coronary angiographic study. *International Journal of Cardiology* 2000;**74**:39–46.
7. Altun A, Erdogan O. Stent implantation to the stenosed right coronary artery in a patient whose right and left coronary arteries originate from a single ostium in the right sinus of Valsalva. *Cardiol Rev*. 2003;**58**:71–3.
8. Raddino R, Pedrinazzi C, Zanini G, *et al*. Percutaneous coronary angioplasty in a patient with anomalous single coronary artery arising from the right sinus of Valsalva. *Int J Cardiol* 2006;**112**:e60–2.

Learning points

- ▶ Anomalous origin of the left main coronary artery from the right sinus of Valsalva (RSV) as a single coronary artery (SCA) is extremely rare.
- ▶ The clinical significance of a SCA depends on its relationship with the aorta and the main pulmonary artery.
- ▶ These anomalous arteries are probably susceptible to atherosclerosis as are normally arising coronary arteries.
- ▶ Percutaneous coronary intervention (PCI) with stent insertion may be a successful therapeutic option; however, accurate morphologic identification of anomalous arteries is mandatory before, to recognise other possible mechanisms of myocardial ischaemia (eg, vascular compression) and to choose the most appropriate type of pharmacological, percutaneous or surgical intervention.
- ▶ In the current era of primary PCI, and increasing prevalence of atherosclerotic coronary artery disease, need to consider the rare possibility of incidentally detected coronary anomaly that may delay the promptness of the intervention.

This pdf has been created automatically from the final edited text and images.

Copyright 2013 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.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Bhairappa S, Bagi V, Subramani KSR, Prasad NM. An interesting clinical scenario of patient with acute myocardial infarction with single coronary artery. *BMJ Case Reports* 2013;10.1136/bcr-2012-006670, Published XXX

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