Dual left circumflex artery - one from left main and one from left anterior descending artery in a patient with anterior wall myocardial infarction — a case report

Authors: Santosh Kumar Sinha, Vinay Krishna, Sunil Tripathi, Lokendra Rekwaal, Anupam Singh, Puneet Aggarwal, Vikash Chaturvedi

DOI: 10.5603/FC.a2019.0025

Article type: Case Reports

Submitted: 2017-11-27

Accepted: 2018-01-02

Published online: 2019-03-27

This article has been peer reviewed and published immediately upon acceptance. It is an open access article, which means that it can be downloaded, printed, and distributed freely, provided the work is properly cited.
Dual left circumflex artery - one from left main and one from left anterior descending artery in a patient with anterior wall myocardial infarction — a case report

Dual left circumflex artery

Santosh Kumar Sinha, Vinay Krishna, Sunil Tripathi, Lokendra Rekwaal, Anupam Singh, Puneet Aggarwal, Vikash Chaturvedi

Department of Cardiology, LPS Institute of Cardiology, G.S.V.M. Medical College, Kanpur, India

Address for correspondence: Santosh Kumar Sinha MD, FAESC, Asst. Professor, Department of Cardiology, LPS Institute of Cardiology, G.S.V.M. Medical College, G.T. Road, Kanpur, Uttar Pradesh 208002, India, fax +91 0512 255 61 99/255 65 21, e-mail: fionasan@rediffmail.com

Abstract
Anomalous origin of the left circumflex coronary artery from the right sinus of Valsalva is a relatively common anatomical variation. Here, we report the case of a 45 year-old male patient with a history of diabetes mellitus, dyslipidemia and smoking who underwent primary percutaneous coronary intervention of the left anterior descending artery in lieu of anterior wall myocardial infarction where dual left circumflex coronary artery was diagnosed angiographically, the first arising from the left main artery in the usual fashion, and the second in the form of an obtuse marginal branch coming from the large diagonal branch.

Key words: coronary artery anomaly; diagonal branch; dual left circumflex coronary artery; obtuse marginal branch; primary percutaneous coronary intervention

Introduction

Malformation within coronary buds on the aortic sinuses or vascular plexuses to which they connect during foetal development leads to coronary artery anomalies whose incidence varies from 0.6 to 1.5%; these may be either totally asymptomatic or life threatening [1–3].
Although anomalously originating left circumflex (LCx) from the right sinus of Valsalva is one of the commonest coronary anomalies, it carries little clinical significance unless it is critically diseased [4]. Normally, left main bifurcates into left anterior descending (LAD) and LCx where LAD courses along the anterior inter-ventricular groove all the way toward the apex of the heart and LCx courses along the left atrio-ventricular groove giving an obtuse marginal branch. When it is dominant, it gives rise to posterior descending artery (PDA) and postero-lateral ventricular (PLV) branch before termination. However, dual LCx arteries, one arising from the left main and one from the obtuse marginal branch as an extension of large diagonal branch of LAD, is an exceedingly rare anomaly.

Case report

A 45 year-old male patient with a history of diabetes mellitus, dyslipidemia and current smoking presented with retrosternal chest pain and sweating of one hour’s duration. His physical examination and biochemistry were all unremarkable. Electrocardiogram revealed ST-elevation in V1-V4 with reciprocal changes in II, III and aVF. Echocardiogram revealed mild hypokinesia in left anterior descending territory (LAD) with ejection fraction of 50%. He was taken for primary percutaneous coronary intervention after proper consent. He was preloaded with prasugrel 60 mg, aspirin 325 mg, and atorvastatin 80 mg. Right femoral artery was cannulated. Coronary angiogram revealed subtotal occlusion of proximal left anterior descending artery with thrombus, and dominant left circumflex artery (Figures 1, 2) while right coronary artery was nondominant. Percutaneous transluminal angioplasty of the culprit artery was planned. Left main coronary artery was cannulated with a 6.5F Launcher extra back up guiding catheter (EBU 3.5; Medtronic, USA) with further administration of 5.000 IU unfractionated heparin. Left anterior descending artery was wired with a 0.014 inch, 140 cm, runthrough wire (Terumo, Japan) and parked distally (Figure 3A). As there was a thrombus burden, it was directly stented with a 3 × 23 mm Xience Prime everolimus-eluting stent (Abbott, USA) by deploying at 11atm pressure achieving TIMI III flow (Figure 3B, 4). His symptoms stabilised, and electrocardiogram showed normalization of ST segment. Based on the findings of an invasive angiogram, a diagnosis was made of dual left circumflex because the second diagonal branch was supplying the obtuse marginal territory which was behaving as a second circumflex artery (Figures 1, 2, 3B, 4A: red arrow; arrowhead). The patient was discharged on the following day with aspirin 150 mg/day, prasugrel 10 mg/day, atorvastatin
80 mg/day, and ramipril 2.5 mg/day. The patient has been doing excellently since then, with regular follow-ups at our institute.

**Discussion**

The most frequently found coronary anomaly is a circumflex artery with a separate origin of the LAD and LCx arteries, with the second most frequently found being an LCx artery arising from the right sinus of Valsalva or the right coronary artery [4].

The inferior and posterior walls of the heart carry a considerable variation in their blood supply.

The term ‘right dominant circulation’ (85% of patients) refers to a pattern in which the right coronary artery (RCA) will give rise to the PDA, posterolateral branches, and atroventricular (AV) nodal artery.

The term ‘left dominant circulation’ (8% of patients) refers to when the LCX gives origin to these vessels.

The term ‘co-dominance’ (7% of patients) refers to when the PDA arises from the RCA and the posterolateral branches from the LCX. This is as proposed by Schlesinger et al [5], and Grossman et al. [6]. In a study by Wilkins [3], 71% of patients with an anomalous circumflex artery had significant coronary atherosclerosis in the proximal portion of the anomalous vessel, a finding similarly shown in analysis from the Coronary Artery Surgery Study by Click et al. [7].

The diagnosis of coronary artery anomalies (CAA) is often incidental, but some CAA can lead to acute coronary syndrome. Therefore, diagnosis and treatment of these pathologies is very important. The key to correct diagnosis is clinical and angiographic suspicion if the posterolateral left ventricular myocardium has a vascular hole (Figure 4A: white circle) during left coronary artery opacification despite wall motion in that area being normal, or if the usual coronary arteries are normal in the case of an acute coronary syndrome. Multidetector computed tomography might be an alternative or adjunctive imaging modality to coronary angiography, but in the setting of acute coronary syndrome it should be avoided as time is of the essence and additional contrast overload is to be avoided. Furthermore, once the culprit artery has been better pacified following intervention, the large diagonal extending as obtuse marginal will be well evident.

Therefore, dual LCx, where the second takes the form of an obtuse marginal branch as an extension of the large diagonal branch, is exceedingly rare.
References


Figure 1. Angiogram showing subtotal occlusion (white arrow) of proximal LAD with thrombus: antero-posterior cranial view (A); right anterior oblique view with cranial angulation (B); red arrow showing obtuse marginal arising from large diagonal branch
**Figure 2.** Subtotal occlusion (white arrow) of proximal LAD with thrombus: antero-posterior caudal view (A); right anterior oblique view with cranial angulation (B); red arrow showing obtuse marginal arising from large diagonal branch

**Figure 3.** LAD stented with $3 \times 23$ mm Xience Prime everolimus-eluting stent at 11 atm pressure (A); LAD showing TIMI III flow (B); red arrow showing obtuse marginal arising from large diagonal branch

**Figure 4.** LAD in extreme lateral view — red arrow showing obtuse marginal as an extension of large diagonal branch (white circle as potential vascular hole); AP caudal view of LAD after stenting