

Case Report

Normal Electrocardiogram in a Patient with an Acute Proximal Left Anterior Descending Coronary Artery Occlusion

NIKUNJ R. SHAH, MIKE VAN DER WATT

Department of Cardiology, Watford General Hospital, Watford, Hertfordshire, UK

Key words:

Coronary, dissection, electrocardiogram, occlusion.

We report the case of an acute proximal occlusion of the left anterior descending (LAD) coronary artery, possibly due to exercise-induced dissection, in a previously well 43-year-old man with persistently normal electrocardiograms (ECG) and cardiac enzymes throughout his hospitalisation. In LAD lesions, ECG repolarisation abnormalities usually reflect the underlying acute coronary event; however, despite negative cardiac biomarkers, a typical cardiac history of chest pain prompted coronary catheterisation. The patient underwent percutaneous coronary intervention to the LAD artery with a dissection flap clearly seen. Successful deployment of drug-eluting stents restored coronary perfusion without residual left ventricular damage. The patient recovered well, and was discharged home on secondary preventative therapies. Our case emphasises that a normal ECG and negative cardiac biomarkers should not preclude further investigations in a patient presenting with a classical ischaemic history, as appropriate early invasive management can prove life-saving.

Manuscript received:

April 1, 2010;

Accepted:

September 20, 2010.

Address:

Nikunj R. Shah

19, Ashleigh Court,

Sherwood, Fulwood

Preston, Lancashire

PR2 9WU, UK

e-mail: [nikunjrahshah@](mailto:nikunjrahshah@hotmail.com)

[hotmail.com](mailto:nikunjrahshah@hotmail.com)

The surface electrocardiogram (ECG) is an easily accessible and rapid diagnostic tool for establishing the aetiology of chest pain in patients presenting to hospital. In the context of an acute coronary syndrome, ischaemic ECG changes are dependent on the time of obtaining the ECG relative to the acute coronary lesion, the distance of the culprit vessel from interrogating ECG leads, the lead arrangement used and the mass of myocardium involved.¹ Coronary artery dissections usually occur following percutaneous coronary intervention (PCI), as extensions from proximal aortic dissections or post coronary bypass surgery, but have also been reported as occurring spontaneously following intense physical exercise.

We report the case of a man presenting with an acutely occluded proximal left anterior descending (LAD) coronary artery, possibly due to spontaneous dissec-

tion, without ischaemic changes on initial or subsequent ECGs.

Case presentation

A previously well 43-year-old Caucasian man attended casualty eight hours after developing severe central crushing chest pain and associated diaphoresis whilst weight lifting at a gymnasium. The pain was unaffected by position, non-pleuritic and not reproduced on palpation of the chest wall. The solitary cardiovascular risk factor was a 20 pack-year smoking history. He denied illicit drug use, including cocaine. Chest X-ray, physical examination and serial ECGs were all essentially normal (Figure 1). There were no phenotypic features suggesting an underlying connective tissue disorder and 12-hour troponin assay was negative ($<0.04 \mu\text{g/L}$). The pain persisted for over 6 hours despite analgesia and after the administration of 300 mg

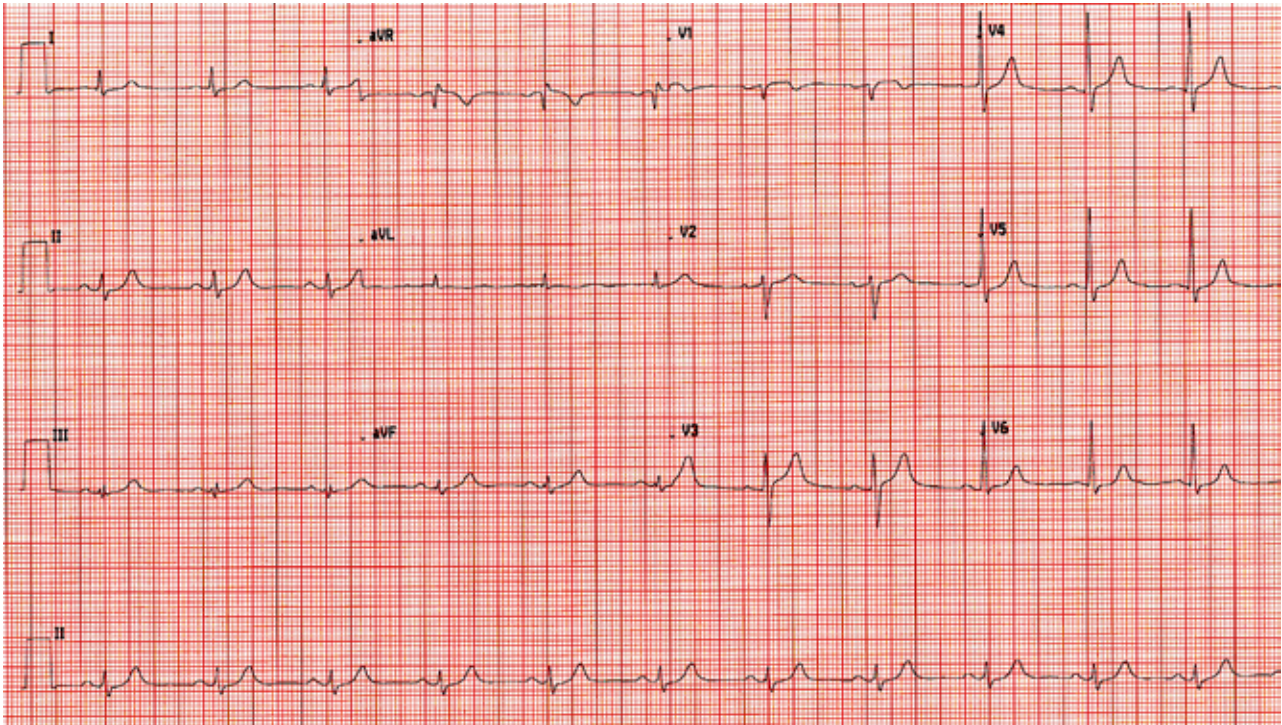


Figure 1. Electrocardiogram of patient demonstrating normal sinus rhythm and no features suggesting acute ischaemia.

aspirin, 300 mg clopidogrel and unfractionated heparin, coronary angiography was performed on account of the highly suggestive cardiac history.

The angiogram demonstrated a proximally occluded LAD artery with no collateralisation to the affected territory (Figure 2). The lesion was easily crossed and, after balloon inflation at low atmospheric pressure, a 45 mm linear dissection flap was seen extending across the first and second diagonal bifurcations (Figure 3). The patient underwent PCI with the distal insertion of a 2.75×32 mm Promus stent (Boston Scientific) and a further 3×12 mm overlap Promus stent deployed to ensure TIMI III antegrade flow across the affected section. A good angiographic result was obtained (Figure 4) and subsequent echocardiography demonstrated well-preserved left ventricular function with no regional wall motion abnormalities noted. He was discharged with secondary preventative therapies and smoking cessation advice.

Discussion

Acute LAD coronary artery occlusions are typically represented as ST-segment elevation in the anterior leads, and less commonly as ST-segment depression or T-wave repolarisation abnormalities on the surface

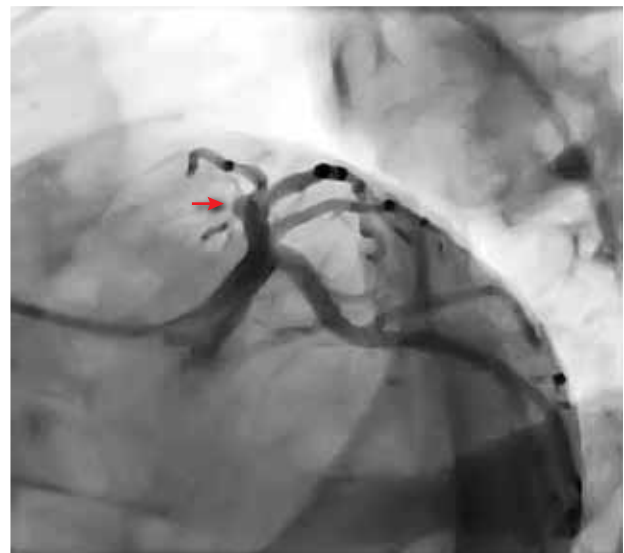


Figure 2. Left anterior oblique caudal view with the arrow demonstrating an occluded left anterior descending coronary artery.

ECG. A proportion of patients, however, do not exhibit the usual ECG features of acute coronary syndromes and it is reported that up to 3.7% of patients with an acute myocardial infarction can have an entirely normal ECG with no evidence of major epicardial occlusion on angiography. In these cases the cul-

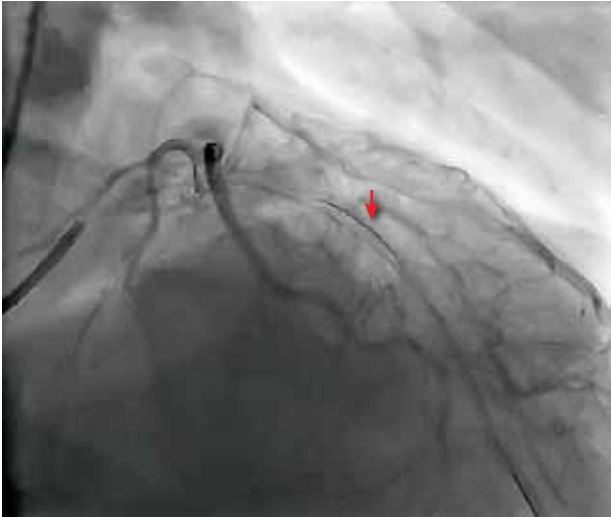


Figure 3. Right anterior oblique cranial view with the arrow demonstrating a linear dissection in the left anterior descending coronary artery.

pritis lesion was found to be a smaller side branch of the native major coronary arteries.² It has been proposed that the maintenance of subendocardial microvascular coronary circulation to the affected territory may account for the absence of ECG changes, despite acute occlusion of a major coronary artery.³

In our case, coronary artery dissection was found on angiography following the initial balloon inflation; however, it is not clear whether the dissection occurred post-PCI or spontaneously. No definitive guidelines currently exist regarding optimal management, but conservative and medical approaches have both been used for non-occlusive dissections.⁴ PCI tends to be adopted for occlusive single vessel dissections, while bypass surgery is reserved for higher risk lesions or multi-vessel involvement.⁵ Each case should be reviewed, with management governed by risk versus benefit of intervention, along with patient choice.

This case emphasises that a normal ECG and negative cardiac biomarkers should not preclude further investigations in patients with a typical cardi-



Figure 4. Arrow indicating stent placement restoring coronary flow in the left anterior descending coronary artery.

ac history of chest pain. It reiterates the importance of clinical acumen alongside the medical technology available. As reflected by our report, appropriate early invasive management can be life saving.

References

1. Parker AB 3rd, Waller BF, Gering LE.. Usefulness of the 12-lead electrocardiogram in detection of myocardial infarction: electrocardiographic-anatomic correlations – part I. *Clin Cardiol.* 1996; 19: 55-61.
2. Caceres L, Cooke D, Zalenski R, Rydman R, Lakier JB. Myocardial infarction with an initially normal electrocardiogram – angiographic findings. *Clin Cardiol.* 1995; 18: 563-568.
3. Nanavati VI, Knapp AL, Passelaqua S. A totally occluded right coronary artery presenting with a normal electrocardiogram. *J Invasive Cardiol.* 2003; 15: 355-358.
4. Maeder M, Ammann P, Angehrn W, Rickli H. Idiopathic spontaneous coronary artery dissection: incidence, diagnosis and treatment. *Int J Cardiol.* 2005; 101: 363-369.
5. Klutstein MW, Tzivoni D, Bitran D, Mendzelevski B, Ilan M, Almagor Y. Treatment of spontaneous coronary artery dissection: report of three cases. *Catheter Cardiovasc Diagn.* 1997; 40: 372-376.