Left main stem stenosis in the unstable patient—forewarned is forearmed

Michael Liang, Damian J Kelly, Gerard Devlin

Abstract

Recognition of clinical and electrocardiographic features suggestive of significant left main coronary artery disease is important, particularly in patients presenting with an acute coronary syndrome. These include hemodynamic instability and widespread ST segment depression, which are well known. In addition, ST segment elevation in lead aVR, a less recognised finding associated with severe left main disease, may be present.

Acute coronary syndromes involving an unstable lesion in the left main coronary artery (LMCA) often lead to rapid clinical deterioration and may present with sudden death. Recognition of clinical and electrocardiographic features suggestive of impending LMCA occlusion is vital to ensure prompt triage and management.

Case report

A previously well and independent 85-year-old lady complained of sudden onset of retrosternal chest pain at rest. Medical history included permanent atrial fibrillation for which she was anticoagulated with warfarin. The initial electrocardiogram showed ST-segment elevation maximal in leads aVL and aVR but also present in the precordial leads V1 and V2, with gross infero-lateral ST-segment depression (Figure 1A). Troponin T was elevated at 0.03 µg/L (<0.03 µg/L).

The ST segment changes and chest pain resolved promptly following sublingual nitroglycerin and supplementary oxygen. A diagnosis of non-ST elevation myocardial infarction was made and the patient was admitted to the coronary care unit for medical management which included aspirin and clopidogrel. Heparin was not initiated because of an international normalised ratio (INR) of 4. Three hours later she experienced recurrent severe pain associated with fall in blood pressure to 78/40 and severe ischaemic ECG changes.

Urgent coronary angiography revealed a critical left main coronary artery (LMCA) lesion (Figure 1B). A 3.5×15 mm Driver (Medtronic Inc, Minneapolis, MN) stent was directly implanted, and post dilated to 4.5 mm in diameter with a very acceptable angiographic appearance. (Figure 1C).

A bare-metal stent was implanted due to the need for long-term warfarin anticoagulation. Following stent insertion there was complete resolution of pain and ECG changes, and her blood pressure normalised at 120/80 mmHg. The patient was discharged on day 4 post-intervention.
Figure 1. (A) ECG showing ST-segment elevation in lead aVR, aVL, V1 and V2 with widespread ST-segment depression in the inferiolateral leads. (B) A coronary angiogram showing proximal 95% left main coronary artery occlusion (arrow). (C) Post-percutaneous coronary intervention with a bare-metal stent (arrow)

Discussion

Severe LMCA stenosis is an uncommon finding during angiography in patients presenting with acute coronary syndrome (ACS). Sudden severe haemodynamic deterioration may result due to transient obstruction of the entire left coronary circulation.

Cardiac catheterisation in the setting of ostial LMCA disease is not without risk and may provoke acute left coronary closure due to catheter-induced plaque disruption. While LMCA disease in patients presenting with stable angina has traditionally been treated with coronary artery bypass surgery, there is accumulating evidence on outcomes following percutaneous coronary intervention (PCI).

Kang et al described similar mortality following LMCA PCI with drug-eluting stents (DES) compared to CABG although the risk of repeat procedures remains higher following PCI.1,2
Recognition of clinical and electrocardiographic features suggestive of significant LMCA disease is an important adjunct to routine clinical risk stratification, allowing cardiac catheterisation in to be expedited while minimising the risks of intervention.

Typical ECG findings in severe LMCA stenosis or occlusion include ST-segment elevation in lead aVR with either widespread ST-segment depression or anterior ST elevation.3–6 Yamaji et al described an aVR ST-segment of >0.05 mV elevation present in 88% of the LMCA obstruction group compared with 46% in the left anterior descending artery.4

During LMCA occlusion the ST-segment elevation often seen in aVR is thought to be due to ischaemia in the basal anterior septum, the summed vectors of which result in a surface rendering of ST-segment elevation due to aVR functioning as a “cavity-lead”.5 These ECG findings in conjunction with clinical features of haemodynamic instability should lead to a high-index of suspicion of LMCA obstruction in unstable ACS patients.

In summary, acute LMCA ACS is frequently associated with haemodynamic instability and high mortality. Patients presenting with this life threatening manifestation of coronary artery disease require urgent invasive assessment and prompt revascularization. Recognition of the clinical syndrome which is associated with transient severe ECG ischemia ± haemodynamic lability is vital to facilitate rapid and appropriate referral for urgent coronary angiography.

**Author information:** Michael Liang, Cardiology Registrar ; Damian J Kelly, Interventional Fellow ; Gerard Devlin, Cardiologist Department of Cardiology, Waikato Hospital, Hamilton

**Correspondence:** Dr Gerard Devlin, Department of Cardiology, Waikato Hospital. Pembroke & Selwyn Sts, Private Bag 3200, Hamilton 3240, New Zealand. Fax: +64 (0)7 8398799; email: gerard.devlin@waikatodhb.health.nz

**References:**