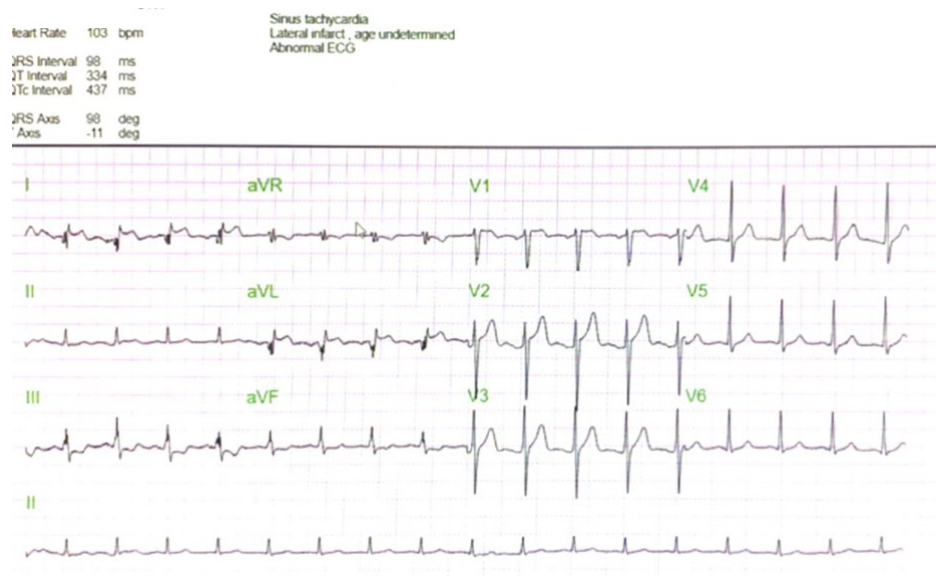


South African Flag Sign—Not Always Acute Myocardial Infarction

Sunil SHETTY* & Suleman AEHTOOSHAM



A 41-year-old Asian man presented with acute onset of retrosternal chest pain. It was of moderate severity with no radiation, worse on exertion and relieved on rest. Electrocardiograph (ECG) (Figure 1) showed ST segment elevations affecting the lateral leads (leads I and aVL) and also the ventral lead (V2), with ST segment depression affecting lead III. The patient was given dual anti-platelet therapy (DAPT) and referred for percutaneous coronary intervention (PCI).

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The South African flag sign (SAFS) (**Figure 2**) is an acute ECG finding typically associated with occlusion of the first diagonal (D1) branch of the left anterior descending (LAD) coronary artery. This occlusion results in myocardial injury and infarction affecting the left lateral ventricular wall, corresponding to specific ECG changes in the affected leads.

This patient was diagnosed with acute coronary syndrome (ACS) and was referred to the cardiac service for management. The troponin levels were normal on two occasions. There was no evidence of pulmonary embolism. He underwent immediate percutaneous coronary angiogram and interestingly, only showed mild to moderate focal disease of the proximal LAD (**Figure 3**). No coronary intervention was done, and he was managed medically with dual antiplatelets, and control of risk factors such as hyperlipidaemia, blood pressure and he was advised to stop smoking.

In 2015, Durant *et al.* reported an ECG pattern of ST elevation in leads I, aVL, and V₂, with ST depression in the inferior leads being associated with occlusion of the D1 artery.² The patient they described had no residual, obstructive CAD within the LAD artery. Littman coined the term “South African flag sign” as an aid to facilitate recognition and earlier detection of

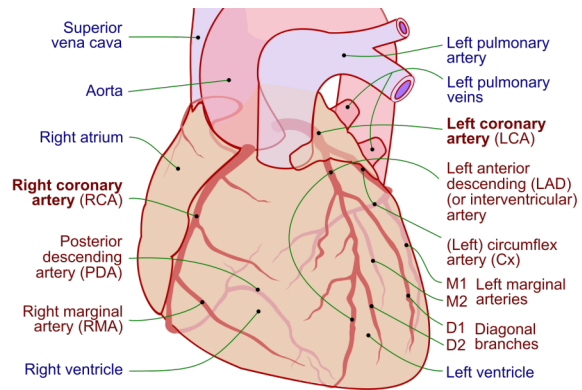


Figure 3: Coronary artery vessels. The first diagonal (D1) is affected in patients with SAFS. Source; Wikipedia (https://en.wikipedia.org/wiki/Coronary_arteries#/media/File:Coronary_arteries.svg)- accessed 31/10/2025)

“high lateral” MI due to D₁-LAD occlusion.³ However, it's important to note that mild CAD can also manifest with similar patterns, though the severity of the ECG changes may be less pronounced.

This term was used as the South African national flag contains a horizontal “Y” (green coloured) that parallels the ST-segment changes. In a 12-lead ECG,

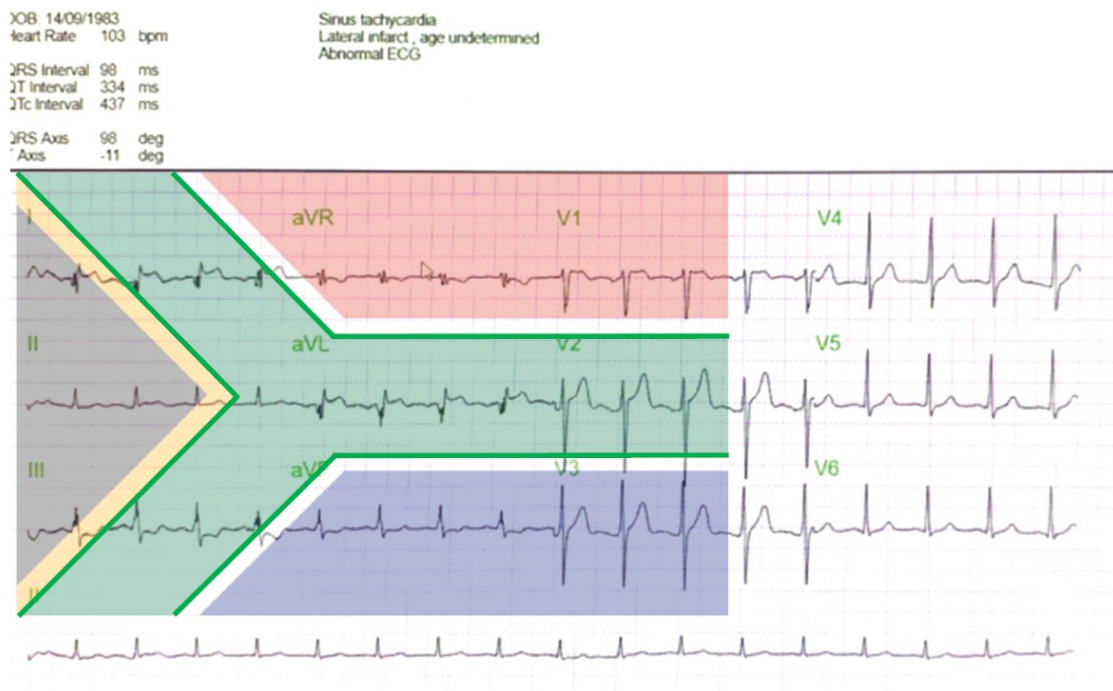


Figure 2: The ECG changes seen in the SAFS are seen in the areas depicted by the inverted green ‘Y’ of the South African flag. The changes include ‘ST’ elevation affecting the lateral lead I, limb lead aVL and ventral lead V2 with corresponding ‘ST’ depression in lead III.

displayed in a conventional 4×3 format, leads I and III coincide with the upper and lower angled limbs of the horizontal “Y,” and the main, straight horizontal limb coincides with leads V_2 and aVL.

While most reports have associated the SAFS with myocardial infarction (D1 occlusion) affecting the high lateral wall, it has also been reported in patients without occlusions on angiography. In one case series of four patients, only half had significant stenosis of D1 with the other cases believed to have aborted infarction despite all having elevated troponin levels.⁴ Therefore, the sensitivity and specificity for D1 occlusions in the presence of the SAFS are low, with the exact diagnostic accuracy remaining unclear. Interestingly, in our case, the troponin levels were normal. It is nevertheless an important finding and patients should be managed accordingly.

Abbreviations

ECG	Electrocardiograph
DAPT	Dual anti-platelet therapy
PCI	Percutaneous coronary intervention
SAFS	South African Flag sign
LAD	Left anterior descending artery
ACS	Acute coronary syndrome
CAD	Coronary artery disease

Declarations

Patient Consent

Patient consent has been obtained.

Disclosure and Conflict of Interest

The authors declare that they have no conflicts of interest and no financial disclosures relevant to this case report.

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Table: ECG patterns associated with myocardial infarction.

No	ECG Sign	Description / Diagnostic Meaning	Discoverer (Year)
1	ST-Segment Elevation (Pardee's Sign)	Upward elevation of the ST segment in contiguous leads, representing acute transmural injury due to myocardial infarction.	Harold E. B. Pardee (1920)
2	Posterior MI Pattern (Mirror Image)	Horizontal ST depression and tall R waves in V1–V3 mirror the posterior wall's ST elevation; indicates posterior infarction.	Frank N. Wilson & George B. Myers, (1935)
3	Persistent ST Elevation/ "Tombstone" Sign	Marked convex ST elevation forming a "tombstone"-shaped R-T complex; indicates large, ongoing transmural infarction with poor prognosis.	Linked to Pardee's early MI observations, term popularised (mid-20th century)
4	Wellens' Sign	Deeply inverted or biphasic T waves in V2–V3 during pain-free periods; an early warning of critical proximal LAD stenosis (pre-infarction).	Hein J. J. Wellens (1982)
5	De Winter's Sign	Upsloping ST depression with tall, symmetrical T waves in precordial leads (no ST elevation); represents proximal LAD occlusion.	Robbert J. De Winter (2008)
6	South African Flag Sign	ST-segment elevation in leads I, aVL, and V2, with ST-segment depression in lead III	Lazlo Littman (2015)
7	Aslanger's Sign	ST depression in V5–V6 with concurrent ST elevation in aVR and V1 during inferior MI; suggests multi-vessel or left main coronary artery disease.	Hakan Aslanger (2020)