

High Lateral STEMI and the South Africa Flag Sign: A Case Report Demonstrating ECG- Angiography Correlation, A Bedside Indicator of Life-Threatening Proximal LAD System Occlusion Involving The First Diagonal Branch

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ABSTRACT

A 43-year-old male without traditional risk factors presented with an acute high lateral ST-elevation myocardial infarction (STEMI). The electrocardiogram (ECG) revealed the distinctive 'South Africa Flag' sign. A significantly elevated troponin-I level (25 ng/mL) corroborated extensive myocardial injury. Emergency coronary angiography identified an ostial occlusion of the first diagonal (D1) branch of the left anterior descending artery as the culprit lesion, which was successfully treated with percutaneous coronary intervention (PCI). This case exemplifies the critical importance of recognizing this ECG pattern as an urgent bedside indicator of a life-threatening D1 occlusion.

Keywords: South Africa Flag Sign; Electrocardiogram (ECG); STEMI

INTRODUCTION

Acute ST-elevation myocardial infarction (STEMI) is a medical emergency where timely diagnosis is crucial for initiating life-saving reperfusion strategies. The 12-lead electrocardiogram (ECG) is the primary diagnostic tool for STEMI and guides immediate treatment decisions.^[1] One such distinctive pattern is the "South Africa Flag" sign (Figure 1), which indicates a high-risk blockage in the proximal left anterior descending (LAD) system involving the first diagonal branch.^[2] This pattern is characterized by ST-segment elevation in leads I and aVL with reciprocal ST-segment depression in inferior leads most pronounced in lead III. Recognizing this ECG pattern is vital, as it signifies a potentially high-risk D1 occlusion that requires urgent revascularization.^[3] We

present a case of a classic South Africa Flag sign on ECG, confirmed to be an acute D1 branch occlusion.

CASE PRESENTATION

A 43-year-old male, with no significant past medical history and no family history of premature coronary artery disease, presented to the emergency department. He was a life-long non-smoker. His chief complaint was severe, crushing substernal chest pain of 3 hours duration, which radiated to his left arm and was associated with profuse diaphoresis.

On admission, his vitals were stable and physical examination was unremarkable. A 12-lead electrocardiogram (ECG) was performed immediately. It revealed ST-segment elevation in leads I and aVL with reciprocal ST-segment depressions in the inferior leads (II, III, aVF), which was more pronounced in lead III, consistent with the classic "South Africa Flag" sign (Figure 1). Initial laboratory investigations revealed a significantly elevated high-sensitivity Troponin-I level of 25 ng/mL, confirming acute myocardial damage. A diagnosis of acute high lateral STEMI was made. The patient was loaded with dual antiplatelet therapy and urgently transferred to the cardiac catheterization laboratory.

Coronary angiography revealed a 100% ostial occlusion of the first diagonal (D1) branch, which was identified as the definitive culprit lesion (Figure 2). Primary percutaneous coronary intervention (PCI) was performed. A drug-eluting stent was successfully deployed in the occluded D1 branch. Post-procedural angiography confirmed excellent Thrombolysis in Myocardial Infarction (TIMI) grade III flow. The patient's post-procedural course was uneventful. Transthoracic echocardiography demonstrated a preserved left ventricular ejection fraction (LVEF) of 55% with no regional wall motion abnormalities.

Figure 1: Electrocardiogram at Presentation

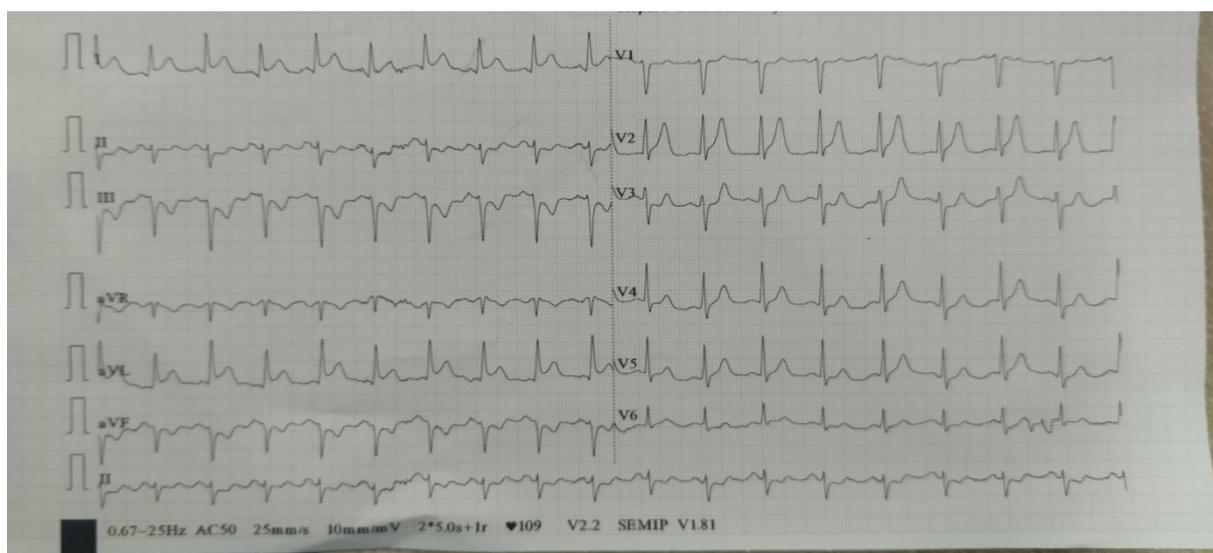


Figure 1A: Original 12-lead electrocardiogram.

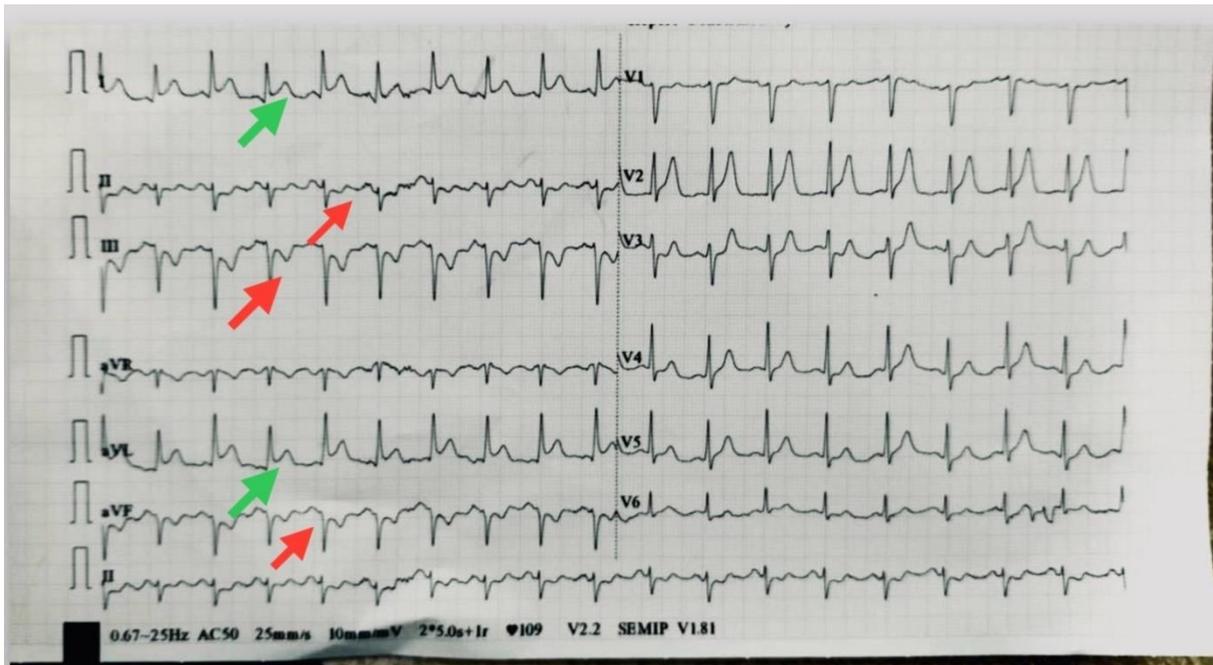


Figure 1B: Annotated tracing demonstrating the 'South Africa Flag' sign. ST-segment elevation (green arrows) in the high lateral leads (I and aVL) with reciprocal ST-segment depression (red arrows) in the inferior leads (II, III, aVF), most pronounced in lead III.

Figure 2: Coronary Angiogram of the Culprit First Diagonal (D1) Branch

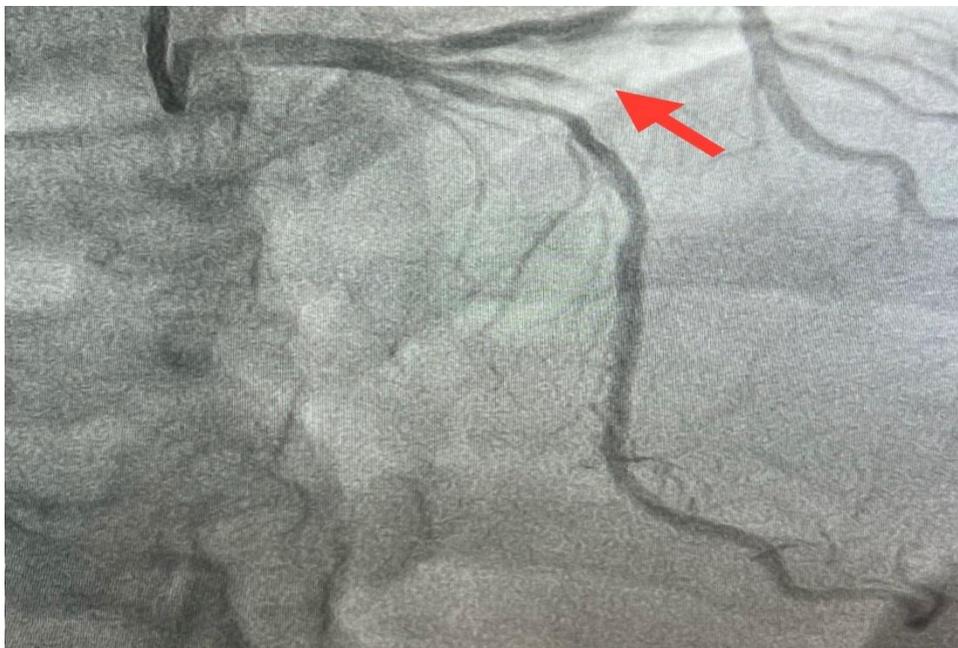


Figure 2A: Right Anterior Oblique (RAO) cranial view showing a 100% ostial occlusion (red arrow) of the first diagonal (D1) branch.



Figure 2B: Final result after percutaneous coronary intervention (PCI) of the D1 branch, showing a patent drug-eluting stent with restored Thrombolysis in Myocardial Infarction (TIMI) grade III flow.

DISCUSSION

This case provides a quintessential illustration of the electrocardiographic "South Africa Flag" sign, a highly specific marker for acute occlusion of the first diagonal (D1) branch.^[2,3] The distinct pattern results from ischemia in the myocardial territory supplied by the D1 branch.^[4]

In this patient, emergency coronary angiography provided definitive anatomical confirmation of a 100% ostial D1 occlusion. The significantly elevated troponin-I level corroborated the extensive myocardial injury. This case underscores that the South Africa Flag sign is a precise indicator of a life-threatening D1 branch occlusion, mandating immediate angiography and intervention.^[3]

The management of this patient highlights the success of integrated STEMI systems of care. The rapid transition from ECG diagnosis to successful PCI of the culprit D1 lesion was paramount. The excellent post-procedural outcome is a direct result of this timely reperfusion.^[5]

Furthermore, this case is notable for the patient's profile. The occurrence of such a critical D1 occlusion in a 43-year-old male without traditional risk factors is a powerful reminder that acute coronary syndromes can present outside classic risk profiles.^[6] This aligns with the concerning trend of premature coronary artery disease in the Indian population.^[7]

CONCLUSION

This case demonstrates that the "South Africa Flag" sign on ECG is a critical and highly specific bedside indicator of acute occlusion of the first diagonal (D1) branch. The excellent clinical outcome underscores the paramount importance of its immediate recognition in triggering urgent coronary angiography and life-saving percutaneous intervention. Furthermore, this case serves as a crucial reminder that acute coronary syndromes can manifest in young individuals devoid of traditional risk factors.

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