



Utility of the Agatston Score in Detecting Obstructive Coronary Artery Disease: A Case Report on the Limitations of Lipid-Based Risk Stratification

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Abstract: - Traditional cardiovascular risk assessment often relies heavily on lipid panels and symptomatic presentation. However, a significant cohort of patients remains at risk despite maintaining "normal" cholesterol levels. This case report discusses a 72-year-old male with a history of myocardial infarction (2019) who presented with a paradoxical profile: stable, normal lipid parameters but a critical Coronary Artery Calcium (CAC) score exceeding 1000. The subsequent discovery of high-grade stenosis and successful intervention via Coronary Angiogram (CAG) and stenting underscores the necessity of non-invasive calcium scoring. This report argues for the broader integration of CAC scoring as a regular diagnostic tool, not only for the elderly but as a proactive screening measure for younger adults to intercept early-stage atherosclerosis.

Keywords: Cardiovascular disease, Coronary Artery Calcium Scoring, Agatston Score, Primary Prevention, Lipid Profile.



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Introduction:

The global landscape of cardiovascular health is shifting, with heart attacks among young adults rising by approximately 2% annually and cardiovascular disease claiming 17.9 million lives each year(1). India has emerged as a critical hotspot in this crisis; while 23% of cardiovascular deaths occur before age 70 in Western nations, that figure climbs to a striking 52% in India (2-4). Recent data indicates that one in five Indian heart attack patients is now under the age of 40, with emergency calls for cardiac issues surging by 55% in several states by 2026 (4).

This trend is driven by high-stress environments, sedentary lifestyles, and rising metabolic disorders, making it clear that identifying atherosclerosis in its subclinical phase is crucial to improving long-term outcomes (5,6). While traditional models provide a statistical probability, measurement of coronary artery calcium offers a direct phenotype of vascular aging(7,8). Recent evidence suggests that the Agatston score significantly improves risk assessment by reclassifying individuals—particularly those in the 'intermediate risk' category—who would otherwise be overlooked by standard risk-factor assessments (7-10).

Case Presentation

The patient, a 72-year-old male, presented for a routine annual cardiovascular review in early March 2026. His medical history was significant Acute coronary syndrome (ACS) in 2019. At the time of the initial event, he had undergone successful thrombolysis. Post-2019, the patient had been strictly adherent to secondary prevention protocols, including antiplatelet therapy and lifestyle modifications.

In early March 2026 on routine checkup at the clinic visit, the patient was asymptomatic. The patient reported no chest pain, dyspnea on exertion, or palpitations. The initial diagnostic workup revealed a lipid profile that would typically be considered "ideal" for an elderly patient on maintenance therapy:

Total Cholesterol	168 mg/dL
LDL	82 mg/dL
HDL	48 mg/dL
Triglycerides	110 mg/dL

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By clinical guidelines, his metabolic management was within range. The ECG showed sinus rhythm, Right Bundle Branch Block with left anterior fascicular block. However, given his history and the limitations of serum biomarkers in predicting plaque stability, a decision was made to perform a non-invasive Coronary Artery Calcium (CAC) scan. The CT scan focused on the coronary arteries without the need for contrast. The Agatston Score was 1026.

A score above 400 is traditionally categorized as "extensive plaque burden," correlating with a high risk of a major adverse cardiovascular event (MACE) within the year. A score exceeding 1000 places the patient in the highest possible risk decile, suggesting that despite his normal lipids, the "calcified architecture" of his arteries was severely compromised.

Intervention Based on the CAC score, the patient was immediately referred for a Diagnostic Coronary Angiogram (CAG). The CAG report showed, Left Anterior Descending (LAD) artery, has 70–80% in single vessel disease. The medical team proceeded with percutaneous coronary intervention (PCI) after obtaining informed consent. In sterile technique under local anesthesia, right femoral artery was cannulated by modified Seldinger technique. 6Fr femoral sheath placed in the right femoral artery. Selective right and left coronary angiogram was done by using J L 3.5 and J R 3.5. Diagnostic procedure went uneventfully. Patient shifted to ICU with stable hemodynamics conditions. The patient recovered without complications, effectively avoiding what likely would have been a second, potentially fatal, myocardial infarction.

Discussion

The Agatston score serves as a definitive quantitative metric, calculated by multiplying the area of calcified plaque by a density factor derived from its peak Hounsfield units (HU). This mathematical approach provides a structural reality that biochemical markers often fail to capture. In the present case, the patient's score of 1026 provided an objective "red flag," shifting the clinical narrative from one of stable maintenance to one of acute, high-grade risk.

The standardized interpretation of these scores highlights the severity of the patient's condition:

- 0: No identifiable plaque.
- 1–10: Minimal plaque burden.
- 11–100: Mild plaque burden.
- 101–400: Moderate plaque burden.
- >400: Extensive plaque burden (Associated with high risk of major adverse cardiovascular events).

A critical nuance in this case is the patient's history of cardiovascular disease (CVD) and his subsequent long-term statin therapy. While statins are highly effective at lowering circulating Low-Density Lipoprotein (LDL) cholesterol, they do not always equate to the cessation of plaque progression. Arsenault et al. observes that individuals treated with statins who achieve low LDL levels may still harbor significant risk if they maintain high concentrations of non-HDL cholesterol or apolipoprotein B (apo B) (7).

Furthermore, atherosclerosis is a complex inflammatory process where the vessel wall's health is as important as the materials circulating within it. Oxidative stress and endothelial dysfunction can lead to "leaky" arterial walls that continue to sequester lipids

even at low serum levels. In this context, calcium acts as a biological "scar," marking the site of chronic inflammatory activity. For this patient, the "normal" lipid profile likely reflected the pharmacological success of his medication rather than the biological health of his coronary architecture.

Currently, Coronary Artery Calcium (CAC) scoring is primarily reserved for patients in the "intermediate risk" category (typically aged 40–70). However, the rising incidence of early-onset coronary artery disease (CAD) among young adults—driven by modern stressors, sedentary lifestyles, and metabolic dysfunction—suggests a need for more sensitive diagnostic thresholds (8).

As noted by Nasir et al. (8), the utility of CAC scoring extends beyond traditional risk groups; it informs the personalized allocation of statins and aspirin in the general population and serves as a critical guide for specialized cohorts, such as those with diabetes or severe hypercholesterolemia. This case exemplifies how CAC scoring can bypass the limitations of blood chemistry. By identifying subclinical atherosclerosis early, clinicians can implement aggressive lifestyle interventions and targeted therapies decades before a symptomatic event occurs.

Conclusion

The clinical journey of this 72-year-old patient serves as a stark demonstration that "normal" laboratory results can often induce a false sense of security in both clinicians and patients. In this instance, the lipid profile acted only as a snapshot of metabolic transit, masking the extensive underlying pathology. The Coronary Artery Calcium (CAC) score of 1026 stood as the sole diagnostic beacon signaling a critical, impending cardiovascular event.

By the time serum lipids become deranged, structural arterial damage is frequently already at an advanced stage. This case underscores that the CAC score provides a permanent, quantifiable record of cumulative arterial damage that biochemical markers simply cannot replicate.

To advance educational research and clinical practice in medical diagnostics, there must be a paradigm shift in preventive cardiology: moving from exclusively "managing the blood" to actively "monitoring the vessel." Integrating non-invasive calcium scoring into regular health screenings—particularly for young adults with hidden risk factors or those with a family history of premature CAD—offers a proactive, data-driven pathway to identify silent obstructions. Such a shift in perspective is essential to intercept early-stage atherosclerosis and significantly reduce the global burden of sudden cardiac death.

Declarations

Conflict of Interest The authors declare that there is no conflict of interest regarding the publication of this paper. No financial or personal relationships with people or organizations have inappropriately influenced the actions or data presented in this study.

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Ethical Statement and Informed Consent

Patient Anonymity and Confidentiality: The authors declare that the patient's identity has been strictly anonymized throughout this report. All identifying information, including name, specific date of birth, and hospital identification numbers, has been removed or de-identified to ensure complete privacy in accordance with the ethical standards of the Institutional Ethics Committee and the Declaration of Helsinki.

Informed Consent: Written informed consent was obtained from the patient for the publication of this case report and any accompanying images or clinical data. The patient was briefed on the educational and research-driven purpose of this documentation. A copy of the written consent is available for review by the Editor-in-Chief of this journal upon request.

Use of Data: The clinical data and diagnostic findings presented herein are utilized exclusively for research and educational purposes to advance the understanding of non-invasive diagnostic procedures in cardiovascular medicine.

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