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IMAGES IN INTERVENTION

Radial Wall Strain in the Assessment of Non-Flow-Limiting Unstable Plaques in MINOCA

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A 62-year-old man was admitted for chest pain associated with ST-segment depression in the lateral leads on electrocardiography and elevated high-sensitivity troponin levels, suggesting a diagnosis of acute coronary syndrome.

Echocardiography revealed a minimal inferior wall motion abnormality. Coronary angiography identified nonsignificant lesions in the mid left anterior descending coronary artery and in the mid circumflex coronary artery (Cx) (supplying the posterior interventricular artery) (**Figure 1A**, Video 1).

Angiography-derived physiological analysis (Pulse Medical) was performed on the lesions, showing a negative Murray law-based quantitative flow ratio, excluding significant flow limitation. However, radial wall strain (RWS), which assesses biomechanical stress by calculating the ratio of luminal diameter change over the cardiac cycle to its maximal diameter using artificial intelligence-assisted angiographic analysis, was significantly elevated at 17% (**Figure 1B**) in the Cx lesion but not in the left anterior descending coronary artery lesion, indicating increased plaque vulnerability.[1]

Cardiac magnetic resonance imaging on day 3 demonstrated late gadolinium enhancement in the inferolateral wall and transmural edema, consistent with myocardial infarction (**Figure 1C**). Subsequent optical coherence tomographic analysis was performed on day 4 and revealed a fibrolipidic moderate atherosclerotic lesion with an intact cap, inflammatory cell infiltration, and semirecent adherent white thrombus, consistent with subacute vulnerable plaque erosion (**Figure 1D**). The patient was discharged on optimal medical therapy and had uneventful evolution.

Visual inspection of coronary angiograms may not always detect unstable plaques and may be insufficient to identify the cause of myocardial infarction with nonobstructive coronary arteries. Although the mid Cx lesion initially appeared benign, the angiography-derived RWS analysis revealed significant biomechanical stress on the plaque.[1] RWS may provide operators with immediate in-depth understanding of plaque vulnerability and might facilitate the identification of the mechanism underlying myocardial infarction with nonobstructive coronary arteries, even before more advanced multimodal imaging modalities are applied.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

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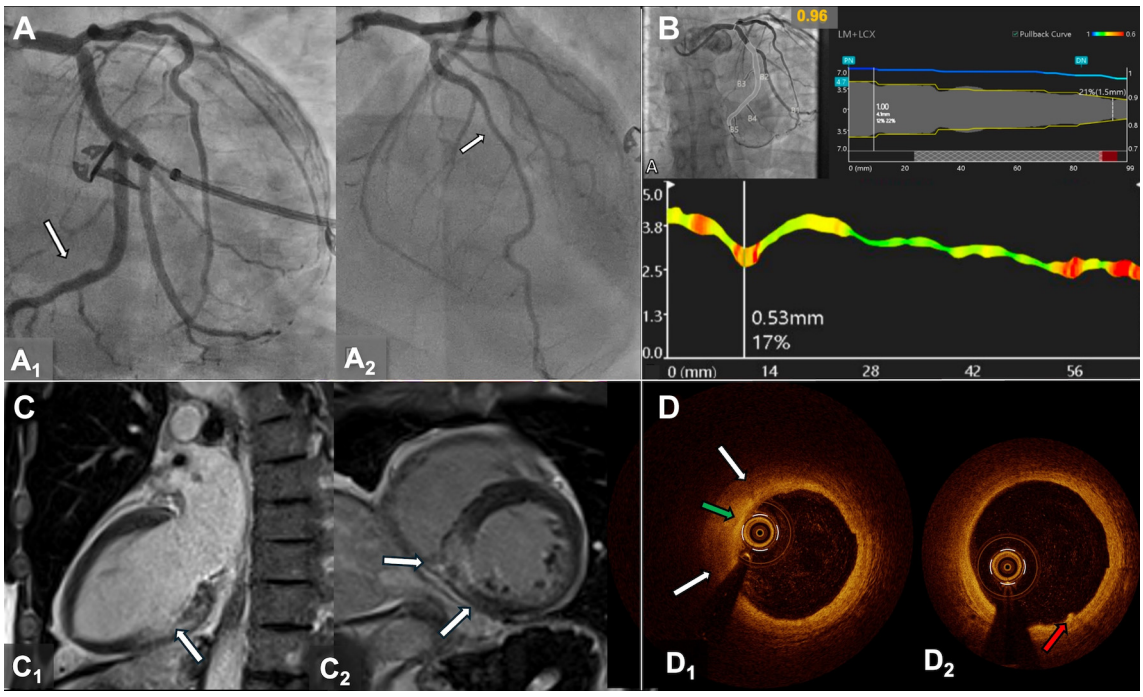
FIGURE 1 **Multimodality Imaging Approach in the Assessment of the Underlying Cause of MINOCA**



(A) Coronary angiography showed nonsignificant lesions (white arrows) in the circumflex coronary artery (Cx) (A1) and the left anterior descending coronary artery (A2). (B) Radial wall strain map along the Cx revealed increased values (upper limit of normal at 13%) at the level of mid Cx, suggesting vulnerable plaque presence. (C) Cardiac magnetic resonance analysis identified transmural late gadolinium enhancement in inferobasal walls (C1, C2). (D) Optical coherence tomographic imaging showed fibrolipidic plaque with an intact cap, moderate lipid pool (D1, white arrow), and inflammatory cell infiltration (D1, green arrow); some remnant residual adherent white thrombus (D2, red arrow) was also observed.

REFERENCE

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APPENDIX For a supplemental video, please see the online version of this paper.