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NEW DIAGNOSTIC METHODS OF MICROVASCULAR ANGINA

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Relevance. Microvascular angina (MVA) is an increasingly recognized clinical condition characterized by ischemic symptoms despite the absence of significant coronary artery obstruction. Traditional diagnostic methods often failed to identify MVA, leading to underdiagnosis and mismanagement. However, advancements in diagnostic tools, including invasive and noninvasive techniques have significantly improved the detection and understanding of MVA. This review explores emerging diagnostic methods and their impact on the identification and management of MVA.

Aim: to evaluate and compare emerging diagnostic methods for MVA, emphasizing their effectiveness, accuracy, limitations and clinical applicability.

Materials and methods. This review article synthesizes current research of the new diagnostic methods of MVA in outpatient department through a comprehensive literature search in databases such as PubMed, Cochrane Library, and Scopus.

Results and their discussion. Coronary Microvascular Dysfunction (CMD) differs from classic coronary artery disease (CAD) in that it does not involve large artery blockages but rather microvascular dysfunction.

The coronary microcirculation consists of three compartments:

- Large Epicardial Vessels (>500 μm) → Minimal resistance (~5%) to blood flow.
- Prearterioles (100–500 μm) → Moderate resistance (~20%) and help maintain stable pressures.
- Small Intramyocardial Arterioles and Capillaries → The main site of blood flow resistance (~75%) and key regulators of myocardial oxygen supply.

Under normal conditions, these vessels dilate in response to metabolic signals, allowing a fivefold increase in blood flow when needed. CMD refers to abnormalities in the coronary microcirculation, which can occur alone or alongside diseases of larger coronary vessels. CMD is classified into four types: *Primary CMD* (no associated heart disease or blockages); *CMD in Myocardial Diseases* (linked to heart muscle disorders); *CMD after Myocardial Infarction* (occurs post-heart attack in patients with blocked arteries); *Iatrogenic CMD* (caused by medical interventions such as stent placement). The mechanisms of CMD are multifactorial and include: f*unctional issues* (poor relaxation, vasoconstriction due to endothelial dysfunction or abnormal smooth muscle tone) and s*tructural changes* (vessel narrowing from muscle hypertrophy, fibrosis, inflammation, or microembolization). CMD is common in patients with MVA, a condition where blood flow reduction causes chest pain despite normal large coronary arteries. Studies suggest that 39-54% of patients with non-obstructive CAD have CMD, though diagnostic thresholds vary.

MVA poses a substantial diagnostic challenge due to its overlap with other cardiovascular conditions and the limitations of traditional imaging modalities. The introduction of novel diagnostic methods has facilitated a better understanding of the pathophysiology of MVA, leading to improved patient outcomes. Emphasis is placed on both invasive and non-invasive modalities, including coronary flow reserve (CFR) measurement, index of microcirculatory resistance (IMR), cardiac magnetic resonance imaging (CMR), positron emission tomography (PET) and transthoracic doppler echocardiography (TTDE). Understanding and implementing these new techniques are crucial in reducing morbidity and enhancing treatment strategies for affected individuals.

Conclusion. The evolution of diagnostic tools has transformed the detection and management of microvascular angina, allowing for earlier and more accurate diagnoses. The increased prevalence of diagnosed MVA cases underscores the importance of integrating these advanced techniques into routine cardiology practice. Future research should focus on optimizing these methods and developing standardized diagnostic protocols to ensure consistent and effective patient care.