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Case Report

Multiterritorial Systemic Embolization as the Initial Manifestation of Left Ventricular Noncompaction Cardiomyopathy

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Abstract

Left ventricular noncompaction cardiomyopathy (LVNC) is a rare myocardial disorder characterized by excessive trabeculation and deep intertrabecular recesses. Thromboembolic complications are recognized but usually involve a single vascular territory.

A 42-year-old man presented with new-onset heart failure and severe left ventricular systolic dysfunction. Transthoracic echocardiography revealed marked trabeculation compatible with LVNC and a mobile apical thrombus. During hospitalization, the patient developed an acute ischemic stroke due to right middle cerebral artery occlusion, followed by the detection of bilateral renal infarctions, segmental pulmonary emboli, and mesenteric ischemia. Cardiac magnetic resonance imaging confirmed LVNC according to Petersen criteria. Infectious and thrombophilia workup were negative. The patient was treated with guideline-directed medical therapy for heart failure and long-term anticoagulation, with favorable clinical and imaging outcomes.

LVNC should be considered in patients with unexplained multiterritorial systemic embolization. Early multimodality cardiac imaging is essential for diagnosis and management.

Keywords: ***Left ventricular noncompaction; systemic embolization; cardiomyopathy; cardiac magnetic resonance; thromboembolism.***

Introduction

Left ventricular noncompaction cardiomyopathy (LVNC) is a myocardial disorder characterized by a bilayered myocardium consisting of a thin compacted epicardial layer and a thick noncompacted endocardial layer with prominent trabeculations and deep intertrabecular recesses [1,2]. It is thought to result from incomplete myocardial compaction during embryogenesis and may occur as an isolated cardiomyopathy or in association with genetic and neuromuscular disorders.

Clinical presentation is heterogeneous, ranging from asymptomatic disease to heart failure, arrhythmias, and thromboembolic events [1]. Although thromboembolism is a recognized complication of LVNC, it most commonly presents as isolated cerebrovascular events. Multiterritorial systemic embolization is rare and may delay recognition of the underlying cardiac etiology [3]. We report a case in which widespread embolic phenomena led to the diagnosis of LVNC, emphasizing the importance of early cardiac imaging in patients with unexplained systemic embolization.

Case Presentation

A 42-year-old man with no relevant past medical history was admitted with progressive exertional dyspnea, fatigue, and reduced exercise tolerance over one month. Physical examination revealed signs of decompensated heart failure, including bibasilar crackles and peripheral edema. Laboratory tests showed elevated natriuretic peptides and mildly increased inflammatory markers. Electrocardiography demonstrated sinus rhythm with nonspecific repolarization abnormalities.

Transthoracic echocardiography revealed a dilated left ventricle with severely reduced systolic function (left ventricular ejection fraction approximately 20%). Prominent trabeculations were noted, raising suspicion for LVNC, and a mobile apical thrombus measuring approximately 1 cm was identified. Therapeutic anticoagulation with enoxaparin was initiated, along with standard heart failure therapy including a beta-blocker and diuretics.

On the ninth day of hospitalization, the patient developed acute left-sided hemiparesis and dysarthria. Computed tomography angiography confirmed occlusion of the right middle cerebral artery, and aspiration thrombectomy was successfully performed. Further investigation with computed tomography of the chest, abdomen, and pelvis revealed additional embolic events, including bilateral renal infarctions, segmental pulmonary emboli with pulmonary infarction, and signs of acute mesenteric ischemia.

Given the extent of embolic involvement, infective endocarditis and hypercoagulable states were considered. Transesophageal echocardiography showed no valvular vegetations, blood cultures remained negative, and an extensive thrombophilia panel was unremarkable. Continuous cardiac monitoring did not reveal atrial fibrillation or other sustained arrhythmias.

Cardiac magnetic resonance imaging confirmed the diagnosis of LVNC, demonstrating a noncompacted-to-compacted myocardial ratio greater than 2.3 in diastole, predominantly involving the apical and mid-ventricular segments. Patchy mid-wall late gadolinium enhancement was also observed.

Heart failure therapy was optimized according to current recommendations, including initiation of sacubitril/valsartan, a beta-blocker, a mineralocorticoid receptor antagonist, and a sodium–glucose cotransporter 2 inhibitor. Anticoagulation was continued and transitioned to long-term oral therapy prior to discharge. The patient showed progressive clinical improvement, with no further embolic events.

At three-month follow-up, transthoracic echocardiography demonstrated improvement in left ventricular systolic function and complete resolution of the apical thrombus. The patient reported significant functional recovery, corresponding to New York Heart Association functional class I–II.

Discussion

This case highlights an uncommon presentation of LVNC complicated by multiterritorial systemic embolization. Thromboembolic events in LVNC are thought to result from a combination of severe left ventricular systolic dysfunction and blood stasis within deep trabecular recesses, promoting intracavitary thrombus formation [4,5]. While isolated embolic events are relatively well described, simultaneous involvement of multiple arterial territories remains rare.

The diagnostic approach to systemic embolization requires careful evaluation of cardiac, infectious, and hematologic causes. In the present case, the absence of atrial fibrillation, negative thrombophilia testing, and exclusion of infective endocarditis supported a cardiomyopathic origin of embolization. Transthoracic echocardiography provided the initial suspicion of LVNC and identified the ventricular thrombus, while cardiac magnetic resonance imaging was essential for diagnostic confirmation.

Cardiac magnetic resonance offers superior spatial resolution and allows application of validated diagnostic criteria, such as the Petersen criterion, as well as assessment of myocardial fibrosis through late gadolinium enhancement [6,7]. The presence of myocardial fibrosis may have prognostic implications and has been associated with adverse clinical outcomes in LVNC.

There is no universal consensus regarding anticoagulation in LVNC. However, anticoagulation is generally recommended in patients with documented ventricular thrombus, prior thromboembolic events, or severe left ventricular dysfunction [3,5]. In this case, long-term anticoagulation combined with guideline-directed medical therapy for heart failure resulted in clinical stabilization, thrombus resolution, and functional improvement.

Conclusion

Left ventricular noncompaction cardiomyopathy should be considered in the differential diagnosis of unexplained systemic embolization, particularly when multiple vascular territories are involved. Early use of multimodality cardiac imaging is critical for accurate diagnosis and appropriate risk stratification. Timely initiation of anticoagulation and optimized heart failure therapy may prevent recurrent embolic events and improve clinical outcomes.

Declarations

Ethics approval and consent to participate

Not applicable

List of abbreviations

LVNC: Left ventricular noncompaction cardiomyopathy

Data Availability

The data analysed for this manuscript is available from the corresponding author on reasonable request.

Conflicts of Interest

The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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Authors' contributions

DDR, AH, MAG were responsible for patient assessment, clinical data collection, and initial diagnostic workup. All authors contributed to data analysis, literature review, and critical revision of the manuscript. All authors also read, critically revised, and approved the final version of the manuscript.

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