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Left Ventricular Non-Compaction in Sub-Saharan Africa: Diagnostic Challenges and the Role of Echocardiography

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Abstract

Background: Left ventricular non-compaction (LVNC) is a rare congenital cardiomyopathy characterized by excessive trabeculations and deep intertrabecular recesses of the left ventricular myocardium. Although increasingly recognized worldwide, LVNC remains underdiagnosed in sub-Saharan Africa due to limited access to cardiac magnetic resonance imaging and insufficient familiarity with echocardiographic diagnostic criteria. **Case Presentation:** We report the case of a 50-year-old woman admitted for advanced heart failure in Brazzaville, Republic of Congo. She presented with New York Heart Association class IV dyspnea and a strong family history of heart failure and sudden cardiac death. Transthoracic echocardiography revealed severe left ventricular systolic dysfunction and typical features of LVNC, including prominent apical and lateral trabeculations with a non-compacted to compacted myocardial ratio of 2.6 at end-systole. Cardiac magnetic resonance imaging, performed subsequently, confirmed the diagnosis. Medical treatment resulted in marked clinical improvement. **Conclusion:** LVNC is likely underrecognized in sub-Saharan Africa. This case demonstrates that careful transthoracic echocardiography, combined with clinical and familial data, can allow a reliable diagnosis even in the absence of cardiac magnetic resonance imaging. Strengthening echocardiographic expertise is essential to improve the detection and management of LVNC in resource-limited settings.

Keywords

Left Ventricular Non-Compaction, Cardiomyopathy, Echocardiography, Heart Failure, Sub-Saharan Africa

1. Introduction

Left ventricular non-compaction (LVNC) is a rare congenital cardiomyopathy defined by the persistence of excessive trabeculations and deep intertrabecular recesses within the left ventricular myocardium. Initially described as a distinct pathological entity in the 1980s, LVNC has since been associated with heart failure, ventricular arrhythmias, and thromboembolic complications [1] [2].

Despite growing awareness in high-income countries, LVNC remains poorly recognized in sub-Saharan Africa. This underdiagnosis is largely explained by limited access to cardiac magnetic resonance imaging (MRI), frequent diagnostic confusion with other cardiomyopathies, and insufficient training in standardized echocardiographic criteria [3]. As a result, many patients are diagnosed late, often after the onset of advanced heart failure or sudden cardiac death.

We report a case of LVNC diagnosed in Brazzaville, Republic of Congo, illustrating the diagnostic value of transthoracic echocardiography in a resource-limited setting and emphasizing the importance of integrating imaging findings with clinical presentation and family history.

2. Case Presentation

A 50-year-old female teacher was admitted to the Cardiology Department B of the University Hospital of Brazzaville in November 2025 for progressive dyspnea. Symptoms had started four months earlier with exertional breathlessness and gradually worsened, culminating in orthopnea and NYHA class IV dyspnea. She also reported intermittent palpitations but denied syncope.

Her medical history included arterial hypertension diagnosed one year earlier and treated with amlodipine. Family history was remarkable: her mother and two siblings had died suddenly after developing heart failure, without prior etiological evaluation.

On admission, the patient was tachycardic (104 bpm) with blood pressure of 140/90 mmHg and oxygen saturation of 97% on room air. Cardiac examination revealed a protodiastolic gallop rhythm and bilateral pulmonary crackles. No peripheral edema was noted.

Chest radiography showed cardiomegaly with a cardiothoracic ratio of 58% and signs of pulmonary venous congestion. Electrocardiography demonstrated sinus rhythm with complete left bundle branch block.

Transthoracic echocardiography revealed non-dilated cardiac chambers and severe left ventricular systolic dysfunction with an ejection fraction of 34%. The myocardium displayed a characteristic two-layered appearance, with a thin compacted layer and a thick non-compacted layer containing prominent trabeculations, predominantly at the apex and lateral and inferior walls. The non-compacted to compacted myocardial ratio measured 2.6 at end-systole, assessed in the parasternal short-axis view, fulfilling echocardiographic criteria for LVNC.

Cardiac MRI (**Figure 1**), performed subsequently, confirmed extensive trabeculations of the left ventricle with preserved right ventricular function and absence

of significant late gadolinium enhancement. Laboratory tests were unremarkable. Genetic testing was not available.

The patient was treated with diuretics, an angiotensin-converting enzyme inhibitor, a sodium-glucose cotransporter-2 inhibitor [4], and anticoagulation during hospitalization. Clinical status improved rapidly, with dyspnea decreasing to NYHA class II. She was discharged after ten days and remains under regular follow-up. Family screening has been initiated.

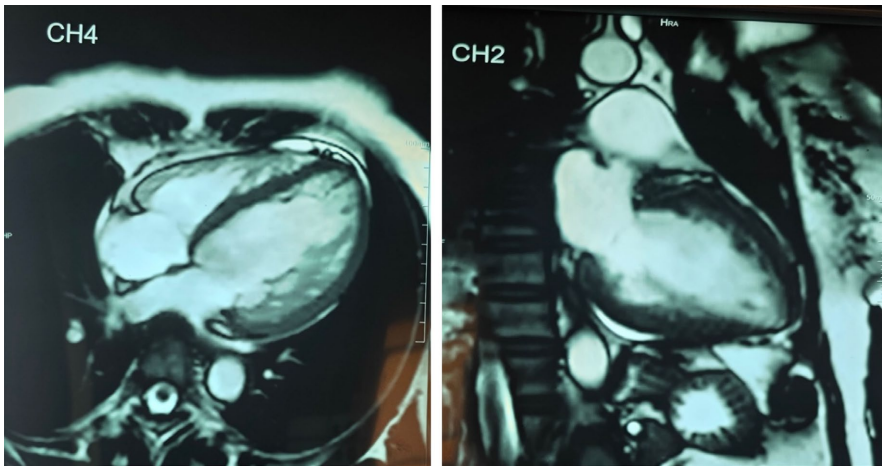

Figure 1. Cardiac magnetic resonance imaging (four-chamber view on left and two-chamber view on the right) confirming extensive left ventricular trabeculations predominantly affecting the apex and lateral wall with relative sparing of the interventricular septum, characteristic of left ventricular non-compaction. Images demonstrate near-global hypokinesis and absence of significant delayed myocardial enhancement.

3. Discussion

This case highlights several important aspects of LVNC diagnosis and management in sub-Saharan Africa.

3.1. Clinical Relevance and Familial Suspicion

The patient presented with advanced heart failure and a striking family history of sudden cardiac death. Familial forms of LVNC have been well documented, and such histories should raise clinical suspicion even when advanced diagnostic tools are lacking [2] [5]. Several gene mutations have been associated with LVNC, including MYH7, MYBPC3, and TTN. In our setting, the inability to perform genetic testing underscores the importance of detailed family history as a diagnostic clue.

3.2. Diagnostic Role of Echocardiography

Echocardiography remains the cornerstone of LVNC diagnosis worldwide. The most widely accepted echocardiographic criteria are those proposed by Jenni *et al.*, which rely on the demonstration of a two-layered myocardium and a non-compacted to compacted myocardial ratio greater than 2.0 at end-systole [6]. Our

patient clearly fulfilled these criteria. However, excessive trabeculation is not specific to LVNC, and several conditions may mimic this phenotype on echocardiography. Differential diagnoses include apical hypertrophic cardiomyopathy, in which myocardial thickening predominates rather than true non-compaction, dilated cardiomyopathy with prominent trabeculations, where trabeculation is secondary to ventricular remodeling, and endocardial fibroelastosis, which should be carefully excluded. Careful assessment of myocardial thickness, ventricular geometry, and clinical context is therefore essential to avoid overdiagnosis of LVNC.

In sub-Saharan Africa, echocardiography is often the only available imaging modality. When performed carefully and interpreted by trained clinicians, it allows reliable diagnosis of LVNC, particularly when imaging findings are consistent with clinical presentation and family history. Cardiac MRI, although valuable for confirmation and differential diagnosis, should be considered complementary rather than indispensable in such contexts.

3.3. Underdiagnosis in Sub-Saharan Africa

The rarity of reported African cases contrasts sharply with the increasing number of diagnoses worldwide. This discrepancy likely reflects underdiagnosis rather than true low prevalence [7] [8]. Misclassification as dilated cardiomyopathy, limited training in LVNC recognition, and lack of systematic family screening contribute to this gap. Improving echocardiographic expertise could substantially reduce missed diagnoses.

3.4. Therapeutic Challenges

Management of LVNC focuses on treating heart failure, preventing arrhythmias, and reducing thromboembolic risk [2] [9]. In patients with LVNC complicated by severe left ventricular systolic dysfunction and complete left bundle branch block, cardiac resynchronization therapy may represent a valuable therapeutic option by improving ventricular synchrony and functional status. Given the presence of complete left bundle branch block and severe systolic dysfunction, cardiac resynchronization therapy could be considered where available. While medical therapy was effective in our patient, access to implantable cardioverter-defibrillators remains extremely limited in our region, despite clear indications in patients with severe systolic dysfunction. This highlights a major disparity in care and a persistent risk of sudden cardiac death.

4. Conclusion

Left ventricular non-compaction is likely underdiagnosed in sub-Saharan Africa. This case demonstrates that, even in the absence of cardiac MRI, appropriate use of transthoracic echocardiography combined with careful clinical and familial assessment can lead to reliable diagnosis. Strengthening echocardiographic training and awareness is essential to improve detection and outcomes of LVNC in resource-limited settings.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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