Daily 10 mg rivaroxaban as a therapy for ventricular thrombus related to left ventricular non-compaction cardiomyopathy

A case report

Huan Sun, MD, PhD, Qini Zhao, MD, Yanjing Wang, MD, Robert Lakin, MSc, Haiyan Feng, MD, Xingyu Fan, MD, Huiling Luo, MD, Dongmei Gao, MD, Lin Liu, MD, PhD, Yuquan He, MD, PhD, Ping Yang, MD, PhD

Abstract

Rationale: Left ventricle non-compaction cardiomyopathy (LVNC) is a rare heart disorder related to thrombosis. Anticoagulant therapy is suggested for the treatment of this disease. The success of the novel oral anticoagulant rivaroxaban as a treatment option for this disorder is unclear.

Patient concerns: A 43-year-old man who felt dizzy at rest was found to have an intraventricular thrombus.

Diagnoses: The thrombus was confirmed by echocardiography. And LVNC was diagnosed by cardiac magnetic resonance (CMR) and echocardiography.

Interventions: He was prescribed a low dose (10 mg daily) of rivaroxaban as treatment.

Outcomes: After 3 months, the thrombus diminished, and the manifestation disappeared.

Lessons: Low dose of rivaroxaban may serve as a viable option for anticoagulation therapy in LVNC patients, with large clinical trials needed to determine the best course of treatment.

Abbreviations: LVNC = left ventricular non-compaction cardiomyopathy, NOACs = novel oral anticoagulations.

Keywords: anticoagulation, LVNC, NOACs

1. Introduction

Left ventricle non-compaction cardiomyopathy (LVNC) is characterized by “spongy” LV myocardium, abnormal trabeculation, and deep intratrabecular recesses resembling the endocardial surfaces of an early embryonic heart.[1,2] Though the incidence and prevalence of LVNC is unclear[3] and LVNC has been considered a relative rare disorder, it has been reported as the third commonly diagnosed cardiomyopathy.[3,4] Moreover, the clinical presentation of LVNC is highly variable, manifesting as end-stage heart failure or associated with arrhythmogenesis or thromboembolic events.[5] The clinical diagnosis is based mainly on cardiac imaging including echocardiography, cardiac computed tomography (CT), as well as cardiac magnetic resonance (CMR), which are useful to identify and characterize the hypertrabeculation of the heart.[6,7] Lacking a clear etiology, the therapy typically consists of a combination of heart failure, antiarrhythmia, and anti-thrombosis treatment.[3]

The thromboembolic risks associated with LVNC are well-established,[8,9] which necessitates the need for antiplalet and/or anticoagulation therapy.[10] However, the low prevalence of LVNC renders the efficacy of anti-thrombolytic therapy in the context of LVNC unclear. The majority of case reports have adopted a warfarin anticoagulant treatment strategy in LVNC.[11] As the era of novel oral anticoagulations (NOACs) has arrived, NOACs may offer a safer and more convenient alternative therapeutic approach in LVNC patients. Specifically, rivaroxaban has been shown to provide effective thromboprophylaxis and a reduced risk of recurrent thromboembolism, without a significant increase in bleeding rates.[12] Moreover, the benefits of rivaroxaban have been shown at low doses (10 mg) that are typically associated with prophylaxis.[13] While rivaroxaban has proven effective in thrombus treatment postinfarction[14] at doses >15 or 20 mg daily, there are no reports or clinical trials studying whether low-dose rivaroxaban may be effective at managing the thromboembolic risks associated with LVNC.
2. Case description

A 43-year-old Asian male, with a 71-kg bodyweight and normal renal function, presented in the Cardiology Department at the China-Japan Union Hospital of Jilin University. He was found to have a mass in the left ventricle in May 2017 during his examination. The patient felt dizzy at rest without falling, spinning, or tinnitus. Dizziness persisted for 1 day and a routine echocardiographic examination discovered “suspected cardiac masses” in left ventricle, which led admission to our hospital. The patient suffered a brain injury 20 years prior, which caused an old trauma in a brain MRI examination without a novel ischemic lesion. The physical examination showed no abnormal signs on the heart.

In our center, the echocardiography found a thrombosis-like mass in left ventricle, which was confirmed by cardiac acoustic contrast, and the patient presented with diminished systolic function characterized by an ejection fraction (EF) as low as 43%. The size of the mass was measured as 1.10 cm × 2.43 cm (Fig. 1A). Moreover, coronary arteriography showed no significant stenosis. As the patient was reluctant to undergo the repeated blood tests for warfarin treatment and bleeding risk, he was prescribed rivaroxaban 10 mg orally once daily.

During the follow-up after 15 days, 45 days and 3 months, the size of the thrombus got decreased and vanished at the 3-month follow-up (Fig. 1B–D). As the thrombus was gone, echocardiographic assessment revealed a suspected left ventricular non-compaction cardiomyopathy (Fig. 1D and E). A follow-up cardiac magnetic resonance exam found hyper trabeculation of the myocardium at apex and free wall (Fig. 2 and Online appendix A, http://links.lww.com/MD/C86 and B, http://links.lww.com/MD/C87), which confirmed the diagnosis of LVNC. Twenty four hours Holter monitoring suggested evidence of a non-sustained ventricular tachycardia. Hence, the patient was given 10 mg oral rivaroxaban once daily to prevent thrombosis as well as beta blocker to improve cardiac function and prevent heart attack.

3. Discussion

LVNC is a rare heart disease. Although the LVNC is reported as the third commonly diagnosed cardiomyopathy, the prevalence is only about 0.05% in adults. The diagnosis of LVNC is based on imaging and clinic features. The manifestations of LVNC include heart failure, arrhythmia, and thrombosis. Though we observed a decreased in systolic function, our patient had no significant symptoms of heart failure, such as shortness of breath or edema, which made the diagnosis of LVNC preferable…
to non-compaction secondary to dilated cardiomyopathy. Moreover, while we discovered a ventricular arrhythmia by Holter monitoring, the arrhythmia was not sustained and caused no independent symptoms. Hence, beta-blocker therapy was initiated to treat both the arrhythmia and heart failure. The symptoms in our patient were most likely caused by thrombosis and transient ischemia, with evidence of recovery observed after anti-thrombosis therapy.

As the thromboembolic risk in LVNC is well known, the choice of anti-thrombosis therapy in these patients is clear. However, limited evidence exists to determine the correct course of anti-thrombotic medication options partly due to the low prevalence LVNC. Aspirin is one documented anti-platelet medication option in LVNC patients. In our patient, the finding of thrombosis in left ventricle made systemic anticoagulation therapy a preferable choice. To the best of our knowledge, this is the first report on using rivaroxaban in LVNC management. Novel oral anticoagulants (NOACs) such as rivaroxaban have shown therapeutic advantages to the commonly administered warfarin during systemic anticoagulation, including improved safety, reduced risk of bleeding, and convenience during therapy. However, more studies are warranted to prove rivaroxaban efficiency and safety in specific thrombosis-related conditions such heart failure or LVNC. Moreover, the ideal dose of rivaroxaban also warrants further consideration. Normally, the dose of rivaroxaban suggested for treating thrombosis, not prophylaxis, is >1.5 or 20 mg daily. In the present patient, only 10 mg of rivaroxaban was necessary for efficient thrombosis treatment, which suggests such a low dose might be enough for LVNC or early LVNC, in which the cardiac function as well as the blood flow within left ventricle are relatively preserved. Though our case is just one example, such an experience may inspire or imply a potential approach to treat thrombus in LVNC, a rare heart disease, before large clinical trials can be used to guide the therapy.

4. Conclusion

LVNC is a rare heart disease associated with obvious thromboembolic risk. In our case report, we have shown the success of low dose rivaroxaban in the anticoagulation therapy in LVNC patients. However, it is clear that the antithrombotic strategy for this disease requires more attention.

References

[1] Chin TK, Perloff JK, Williams RG, et al. Isolated noncompaction of left ventricular myocardium. A study of eight cases. Circulation 1990; 82:507–13.
[2] Maron BJ, Towbin JA, Thiene G, et al. Contemporary definitions and classification of the cardiomyopathies: an American Heart Association Scientific Statement from the Council on Clinical Cardiology, Heart Failure and Transplantation Committee; Quality of Care and Outcomes Research and Functional Genomics and Translational Biology Interdisciplinary Working Groups; and Council on Epidemiology and Prevention. Circulation 2006;113:1807–16.
[3] Towbin JA, Lorts A, Jeffries JL. Left ventricular non-compaction cardiomyopathy. Lancet 2015;386:813–25.
[4] Ritter M, Oechslin E, Sutsch G, et al. Isolated noncompaction of the myocardium in adults. Mayo Clin Proc 1997;72:26–31.
[5] Murphy RT, Thaman R, Blanes JG, et al. Natural history and familial characteristics of isolated left ventricular non-compaction. Eur Heart J 2003;26:187–92.
[6] Petersen SE, Selvanyagam JB, Wiesmann F, et al. Left ventricular non-compaction: insights from cardiovascular magnetic resonance imaging. J Am Coll Cardiol 2005;46:101–5.
[7] van Dalen BM, Caliskan K, Soliman OI, et al. Left ventricular solid body rotation in non-compensation cardiomyopathy: a potential new objective and quantitative functional diagnostic criterion? Eur J Heart Fail 2008;10:1088–93.
[8] Ichida F, Hamamichi Y, Miyawaki T, et al. Clinical features of isolated noncompaction of the ventricular myocardium: long-term clinical course, hemodynamic properties, and genetic background. J Am Coll Cardiol 1999;34:23–40.
[9] Pitta S, Thatai D, Afonso L. Thromboembolic complications of left ventricular noncompaction: case report and brief review of the literature. J Clin Ultrasound 2007;35:465–8.
[10] Petersen SE, Timperley J, Neubauer S. Left ventricular thrombi in a patient with left ventricular non-compaction in visualisation of the rationale for anticoagulation. Heart 2005;91:e4.
[11] Mandalaya R, Boigon M, Nweke N, et al. Left ventricular non-compaction syndrome misdiagnosed as dilated cardiomyopathy on several occasions, presenting with recurrent stroke. Cardiol Res 2014;5:427–7.
[12] Weitz JI, Lensing AWA, Prins MH, et al. Rivaroxaban or aspirin for extended treatment of venous thromboembolism. N Engl J Med 2017;376:1211–22.
[13] Weitz JI, Bauersachs R, Beyer-Westendorf J, et al. Two doses of rivaroxaban versus aspirin for prevention of recurrent venous thromboembolism. Rationale for and design of the EINSTEIN CHOICE study. Thromb Haemost 2015;114:645–50.
[14] Seecheran R, Seecheran V, Persad S, et al. Rivaroxaban as an antithrombotic agent in a patient with ST-segment elevation myocardial infarction and left ventricular thrombus: a case report. J Investig Med High Impact Case Rep 2017;5:23324709617697991.
[15] Thuny F, Jacquer A, Jop B, et al. Assessment of left ventricular noncompaction in adults: side-by-side comparison of cardiac magnetic resonance imaging with echocardiography. Arch Cardiovasc Dis 2010;103:150–9.
[16] Floria M, Tinica G, Grecu M. Left ventricular non-compaction: clinical features and quantitative functional diagnostic criterion? Eur J Heart Fail 2012;14:628–36.