



# Double-Chamber Left Ventricle as a Potential Cardioembolic Source in Acute Ischemic Stroke

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Dear Editor,

Double-chamber left ventricle (DCLV) is a rare, usually asymptomatic congenital heart defect.<sup>1</sup> However, arrhythmia and chest pain have been reported in adult DCLV patients.<sup>2,3</sup> We report the case of a patient with acute ischemic stroke and DCLV.

A 74-year-old female was admitted with sudden-onset motor weakness of the left limb and facial muscles, anosognosia, and dysarthria. Her score on the National Institutes of Health Stroke Scale was 6. She had no history of cardiac trauma or myocardial infarction. Electrocardiography revealed a sinus rhythm. Brain computed tomography (CT) and CT angiography revealed a hyperdense middle cerebral artery (MCA) sign and occlusion in the M2 segment of the right MCA. Initial blood test results (including for infection and inflammation markers) were within the reference ranges, with the exception of elevated D-dimer (1.75 mg/L). Suspecting hyperacute ischemic stroke, we administered intravenous recombinant tissue plasminogen activator. Subsequent digital subtraction angiography confirmed occlusion in the M2 segment of the right MCA. Mechanical thrombectomy using a stent retriever successfully recanalized the occluded vessel (Fig. 1A and B). Diffusion-weighted magnetic resonance imaging revealed multiple tiny scattered right parietal-temporal lesions (Fig. 1C). Her neurological symptoms completely resolved after 1 day.

Transthoracic echocardiography (TTE) revealed an abnormal left ventricle (LV) that was divided into two chambers separated by muscular connections in continuity with the LV lateral wall, suggestive of DCLV. Color Doppler imaging revealed turbulent systolic inflow and diastolic outflow in the primary chamber (Fig. 1D). Transesophageal echocardiography (TEE) revealed clear DCLV with echogenic material in the accessory cavity, which was thought to be a thrombus since it was attached to the thinned and akinetic myocardium (Fig. 1E and Supplementary Video 1 in the online-only Data Supplement). There was no evidence of common etiologies of cryptogenic stroke, such as paroxysmal atrial fibrillation on Holter monitoring, patent foramen ovale in the air-bubble test on transcranial Doppler monitoring and TEE, or aortic arch atheroma and obstructive coronary artery disease on cardiac CT angiography (CCTA). In addition, there was no stenosis of the corresponding cerebral artery. DCLV with cardiac thrombus was also seen on CCTA (Supplementary Fig. 1 in the online-only Data Supplement). Warfarin was initiated for the mobile thrombus on the posterior wall of the LV. Early neurological deterioration was not observed during the following 1 week, and so she was discharged. Follow-up TTE after 3 weeks of anticoagulation treatment revealed that the thrombus had disappeared (Fig. 1F).

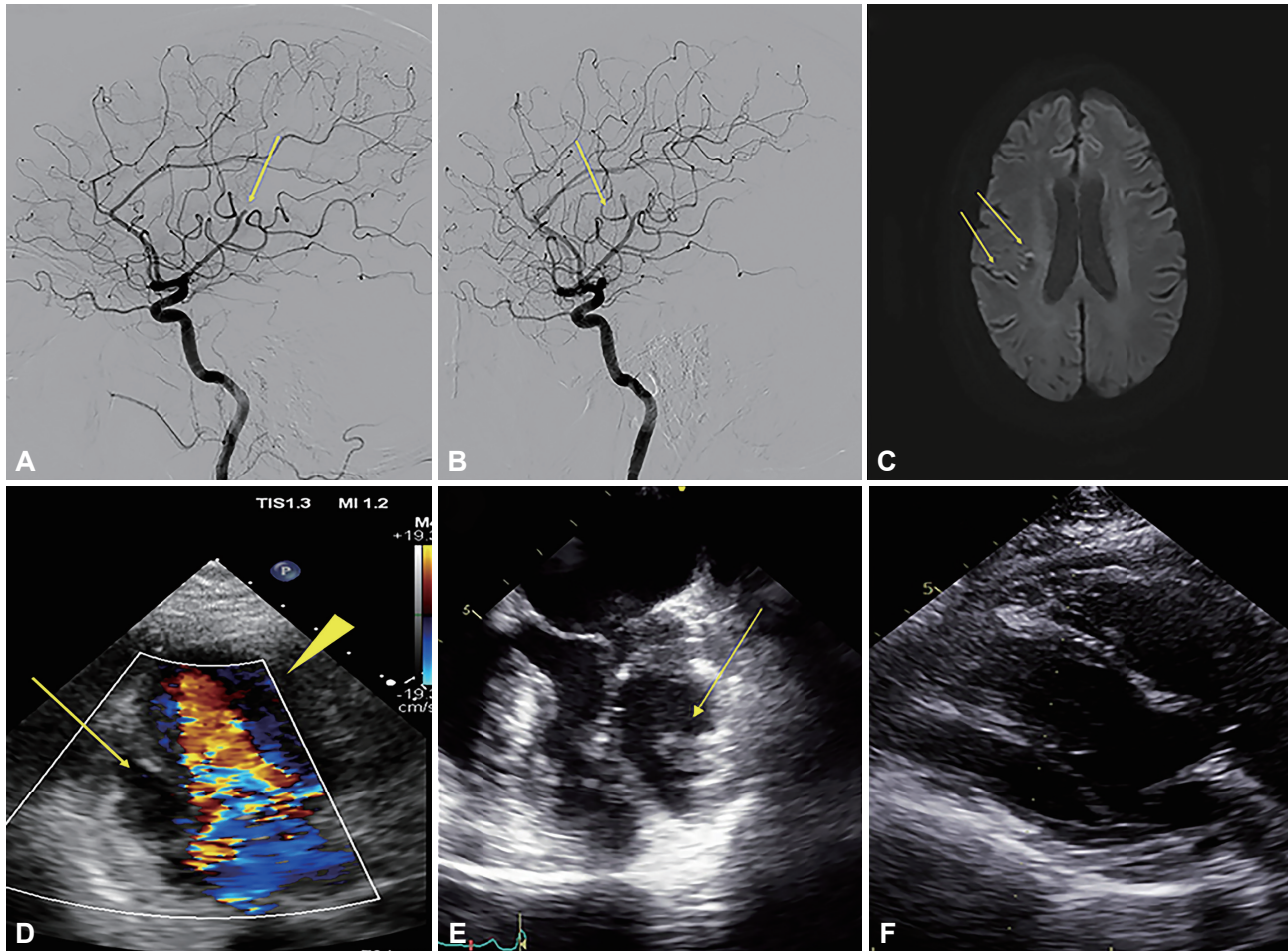
DCLV refers to ventricular subdivision by an anomalous septum or muscle bundle. Since DCLV is a rare, asymptomatic congenital disease, it is mostly discovered incidentally during cardiac evaluations.<sup>1</sup> With a reported prevalence of 0.04–0.42%, DCLV has no standard treatment guidelines. To our knowledge, only one case has been diagnosed in a patient presenting with ischemic stroke.<sup>4</sup>

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**Fig. 1.** Radiologic findings of the patient. A: Occlusion in the M2 segment of the right middle cerebral artery (MCA) confirmed on digital subtraction angiography. B: Recanalization of the occlusion in the M2 segment of the right MCA using mechanical thrombectomy. C: Multiple tiny scattered right parietal-temporal lesions on diffusion-weighted imaging. D: Color Doppler imaging reveals turbulent systolic and diastolic flow in the primary (arrowhead) and secondary (arrow) chamber. E: Transesophageal echocardiography reveals a clear double-chamber left ventricle with echogenic material in the accessory cavity. F: Follow-up transthoracic echocardiography after 3 weeks of anticoagulation treatment reveals that the thrombus has disappeared.

While an LV thrombus is a common complication of LV dysfunction following myocardial infarction, LV apical aneurysm increases its risk. Since DCLV also has an accessory chamber, it could be a source of thrombi. The low blood velocity, swirl-like flow pattern, and echogenic material observed in our patient's secondary chamber were risk factors for thrombosis.<sup>4</sup> Warfarin may therefore also prevent thromboembolism originating from DCLV-associated thrombosis.

In conclusion, DCLV may cause thrombosis and thromboembolic stroke. Cardiac evaluations to detect entrapped DCLV-associated thrombi may aid the accurate diagnosis and treatment of stroke.

### Supplementary Video Legend

Video 1. Echogenic material is attached to the thinned and akinetic myocardium in the accessory cavity, suggestive of a

thrombus.

### Supplementary Materials

The online-only Data Supplement is available with this article at <https://doi.org/10.3988/jcn.2021.17.3.470>.

### Author Contributions

Conceptualization: Ho Geol Woo, Sung Hyuk Heo. Data curation: all authors. Writing—original draft: Ho Geol Woo. Writing—review & editing: Sung Hyuk Heo.

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### Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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