

IMAGES IN INTERVENTION

Real-Time Detection of an Acute Cerebral Thrombotic Occlusion During a Transcatheter Valve Intervention



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A 77-year-old man with a history of severe chronic obstructive pulmonary disease and severe symptomatic aortic stenosis was admitted for transfemoral transcatheter aortic valve replacement with a 31-mm self-expandable valve (CoreValve Evolut R, Medtronic, Minneapolis, Minnesota). Real-time continuous monitoring of blood flow velocity with transcranial Doppler ultrasonography (WAKIe-2TC, Atys Medical, Soucieu-en-Jarrest, France) was performed during the procedure. First, balloon aortic valvuloplasty, with a 20-mm balloon, was performed. After balloon aortic valvuloplasty but before valve implantation, an abrupt interruption of the blood flow velocity in the left middle cerebral artery (LMCA) was detected, with normal flow maintained in the contralateral artery (Figure 1A, Online Video 1). Cerebral arteriography showed acute thrombotic occlusion of the LMCA (Figure 1B, Online Video 2). The thrombus (Figure 1C), consisting of accumulations of fibrin, platelets (Figure 1C inset, arrowhead) and erythrocytes (Figure 1C inset, arrow), was successfully retrieved with a SOLITAIRE 26 × 30 mm (Covidien, Irvine, California) stent retriever, thereby restoring

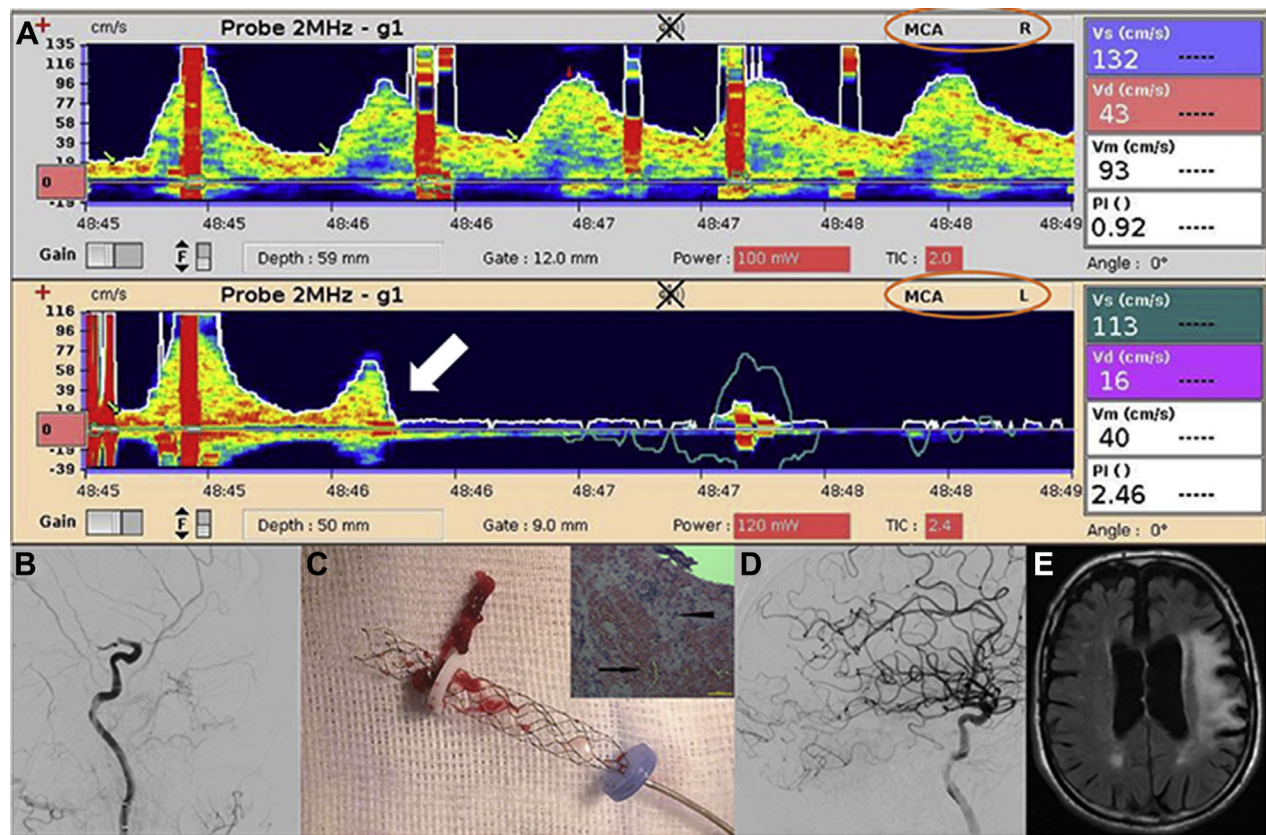
LMCA blood flow (Figure 1D, Online Video 3). The patient's symptoms were rapidly reversed. Magnetic resonance imaging at 3-month follow-up showed a large cerebral infarction in the LMCA territory (Figure 1E). At 6-month follow-up, hemiparesis recovered completely, with mild dysphasia remaining.

Stroke during transcatheter valve interventions is a potentially devastating complication. Mechanical thrombectomy could be an effective treatment method. Optimal periprocedural antithrombotic management (1) is essential, and embolic protection devices should be considered in high-risk populations (2). Close collaboration between interventional cardiologists and the stroke care team is advisable to establish an early management plan and minimize brain damage.

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FIGURE 1 Real-Time Continuous Monitoring of Blood Flow Velocity With Transcranial Doppler Ultrasonography

Complete interruption of the cerebral blood flow signal of the left middle cerebral artery (LMCA), due to thrombotic occlusion after balloon aortic valvuloplasty for transcatheter aortic valve replacement, is depicted. **(A)** The cerebral blood flow in the right MCA was not affected. See [Online Video 1](#). **(B)** Cerebral angiography showing occlusion of the left MCA. See [Online Video 2](#). **(C)** Histopathologic analysis of the embolized material (hematoxylin and eosin stain) showed fresh platelet thrombus in the accumulations of fibrin and platelets (**arrowhead**), and platelets and erythrocytes (**arrows**). **(D)** Cerebral angiography showing complete resolution of the left MCA occlusion after mechanical thrombectomy. See [Online Video 3](#). **(E)** Magnetic resonance imaging at 3-month follow-up showed a large cerebral infarction in the left MCA territory.

REFERENCES

1. Capodanno D, Angiolillo DJ. Antithrombotic therapy for prevention of cerebral thromboembolic events after transcatheter aortic valve replacement: evolving paradigms and ongoing directions. *J Am Coll Cardiol Intv* 2017;10:1366-9.
2. Seeger J, Gonska B, Otto M, Rottbauer W, Wöhrle J. Cerebral embolic protection during transcatheter aortic valve replacement significantly reduces death and stroke compared with unprotected procedures. *J Am Coll Cardiol Intv* 2017;10:2297-303.

KEY WORDS aortic stenosis, stroke, transcatheter aortic valve replacement, transcranial Doppler

APPENDIX For supplemental videos, please see the online version of this paper.