Successful Endovascular Stroke Rescue With Retrieval of an Embolized Calcium Fragment After Transcatheter Aortic Valve Replacement

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A 90-year-old symptomatic woman with a critical aortic stenosis was referred for transcatheter aortic valve replacement (TAVR). The procedure was performed under locoregional anesthesia from a right femoral approach, with the successful implantation of a 23-mm CoreValve (Medtronic Inc, Minneapolis, MN). Echocardiographic assessment after TAVR showed a mean transprosthetic gradient of 16 mm Hg and trace paravalvular regurgitation. After percutaneous closure of the right femoral artery, the patient suddenly became unresponsive. After prompt intubation, emergency cerebral MRI was performed to assess the presence of reversible ischemia and exclude parenchymal hemorrhage, showing partial occlusion of the right middle cerebral artery with ischemia in the corresponding territory (Figure 1). Conventional cerebral angiography confirmed partial M1-M2 occlusion of the right middle cerebral artery (Figure 2A; Movie I in the Data Supplement). Complete revascularization was achieved using a 4.0×20 mm Solitaire FR retrievable stent (ev3, Irvine, CA) with capture of the embolic material (Figure 2B; Movies II and III in the Data Supplement). The onset-to-reperfusion delay was 150 minutes.

Histopathologic assessment of the recovered debris (2×6 mm) revealed a calcium fragment that most likely detached from the native aortic valve or the aortic wall (Figure 3).

The patient was extubated on the following day. She was fully conscious and orientated, with normal neurological status (modified Rankin Scale score, 0). She had an uneventful recovery and was discharged 9 days after the procedure.

Discussion

Stroke occurs during or <24 hours of TAVR in ≈3% of cases and is associated with a 12-fold increase in 30-day mortality.[1] This complication is presumably related to manipulation of large-bore catheters across the aorta and the calcified aortic valve. A recent histopathologic study on embolized debris captured during TAVR with a filter-based cerebral protection device revealed either thrombotic material or embolized tissue debris derived most likely from the native aortic valve leaflets or aortic wall.[2]

Endovascular intervention for stroke due to catheter-related thrombus during TAVR has been previously reported.[3] Although mechanical retrieval of nonthrombotic material from cerebral arteries after acute ischemic stroke has also been described,[4] the present case is the first report of retrieval of embolized tissue material presumably originating from the native aortic valve or aortic wall after TAVR. Furthermore, the Solitaire FR retrievable stent has been proven effective in the treatment of acute ischemic stroke, with high rates of successful recanalization and favorable neurological outcomes during follow-up, as well as a low incidence of procedure-related complications (such as distal emboli to a new territory or vessel dissection or perforation).[5] In the setting of stroke complicating TAVR, mechanical endovascular revascularization with retrievable stents may be the treatment of choice, because sole intravenous or intra-arterial thrombolysis is contraindicated in fully heparinized patients and may be ineffective in the presence of embolized tissue material.

Ultimately, the present case underscores the advantage of locoregional anesthesia during TAVR for immediate diagnosis of neurological events, because interventional rescue could be potentially delayed when patients are intubated and sedated.

Disclosures

Dr Himbert is a proctor for Medtronic Inc. Dr Vahanian received speaker's fees from Medtronic Inc. The other authors have no conflicts to report.

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Received October 18, 2013; accepted December 5, 2013.

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The Data Supplement is available at http://circinterventions.ahajournals.org/lookup/suppl/doi:10.1161/CIRCINTERVENTIONS.113.000995/-/DC1.

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(*Circ Cardiovasc Interv*. 2014;7:125-126.)

***Circ Cardiovasc Interv* is available at http://circinterventions.ahajournals.org** **DOI: 10.1161/CIRCINTERVENTIONS.113.000995**

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KEY WORD: stroke

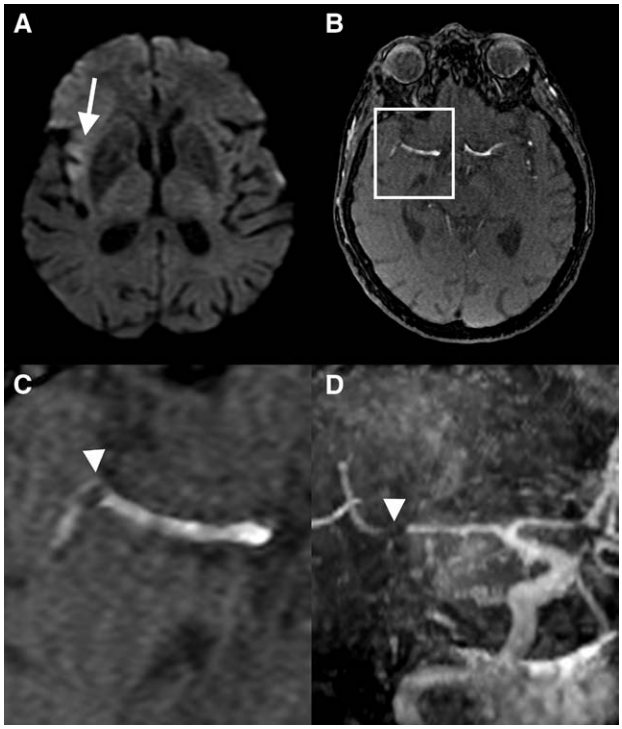

Figure 1. A, Diffusion-weighed MRI showing ischemia (faint hypersignal; arrow) in the territory of the right middle cerebral artery. **B** to **D**, Magnetic resonance angiography showing partial occlusion of the right middle cerebral artery (arrowhead) on 3-dimensional time-of-flight sequences. **C**, Close-up of the boxed area in **B**.

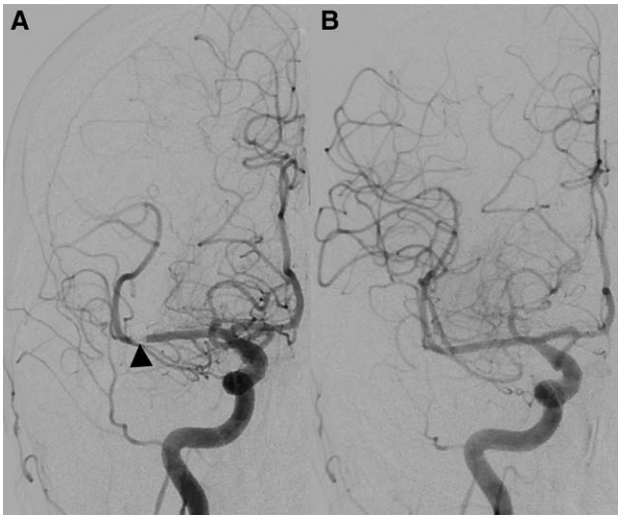

Figure 2. A, Conventional cerebral angiography confirming partial M1-M2 occlusion of the right middle cerebral artery (arrowhead). **B**, Final angiography after retrieval of the embolized debris showing complete patency of the right middle cerebral artery.

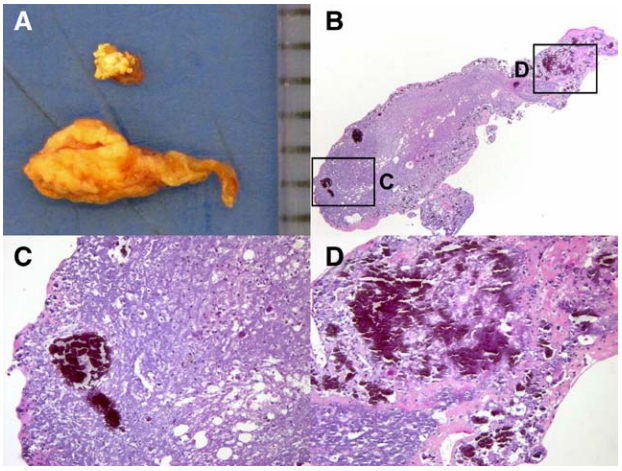

Figure 3. A, Debris recovered during endovascular revascularization. The distance between the lines of the scale on the left is 1 mm. **B**, Histopathologic assessment (hematoxylin and eosin stained) showing pure calcific material. **C** and **D**, High-power magnification of the boxed areas in **B**.

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Circ Cardiovasc Interv. 2014;7:125-126
doi: 10.1161/CIRCINTERVENTIONS.113.000995
Circulation: Cardiovascular Interventions is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Print ISSN: 1941-7640. Online ISSN: 1941-7632

SUPPLEMENTAL MATERIAL

Movie I. Conventional cerebral angiography showing partial M1-M2 occlusion of the right middle cerebral artery.

Movie II. Deployment of the Solitaire FR retrievable stent (ev3, Irvine, CA), with restoration of flow (the three dots indicate the distal marker of the device).

Movie III. Final angiography after retrieval of the embolized debris showing complete patency of the right middle cerebral artery.