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Cerebral embolic protection with filters and an occlusion balloon catheter during transcatheter aortic valve replacement

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ESC curriculum 4.2 Aortic stenosis • 2.2 Echocardiography

Case description

A 77-year-old man with severe aortic stenosis in the absence of infection was referred for transcatheter aortic valve replacement (TAVR). Echocardiography revealed a mobile mass on the non-coronary cusp (*Figure 1A*). Brain magnetic resonance (MR) imaging showed the occlusion of the right internal carotid artery with the intra-arterial signal, prognosticating a territory susceptible to infarction during extracorporeal circulation (*Figure 1B* and *C*). He manifested hemiparesis attributable to a prior cerebral infarction. Considering the high risk for intra-operative cerebral infarction, we decided to perform a transfemoral TAVR with embolic protection devices (EPDs) after obtaining ethical sanction from the local review board. Spider FX (Medtronic) was deployed in the left internal carotid artery and the left vertebral artery through the left femoral artery. Simultaneously, an 8 Fr OPTIMO EPD (Tokai Medical Products) was deployed in the right subclavian artery via the right brachial artery (*Figure 1D*). The CE-marked devices remained unavailable in Japan. A 29 mm Evolut PRO+ (Medtronic) was deployed, and there were no macroscopic materials trapped by all filters and the balloon catheter (*Figure 1E–G*). Post-operative diffusion-weighted MR imaging showed minor ischaemic lesions (*Figure 1H*), yet neurological examinations revealed an absence of symptoms indicative of cerebral infarction.

Multiple cases of TAVR employing EPDs, such as filter devices and balloon catheters, have been reported to be performed safely.[1] These methods have been employed to safeguard the comprehensive cerebral perfusion region. The incorporation of a selective filter placement in the left vertebral artery, in conjunction with a dual-filter system in the brachiocephalic trunk and left common carotid artery, has demonstrated the efficacy of protective measures,[2] supporting the concept of the complete filter-based cerebral protection strategy. This approach is particularly advantageous in rendering TAVR procedures secure among patients with predisposing factors such as a history of cerebrovascular events, chronic kidney disease.[3]

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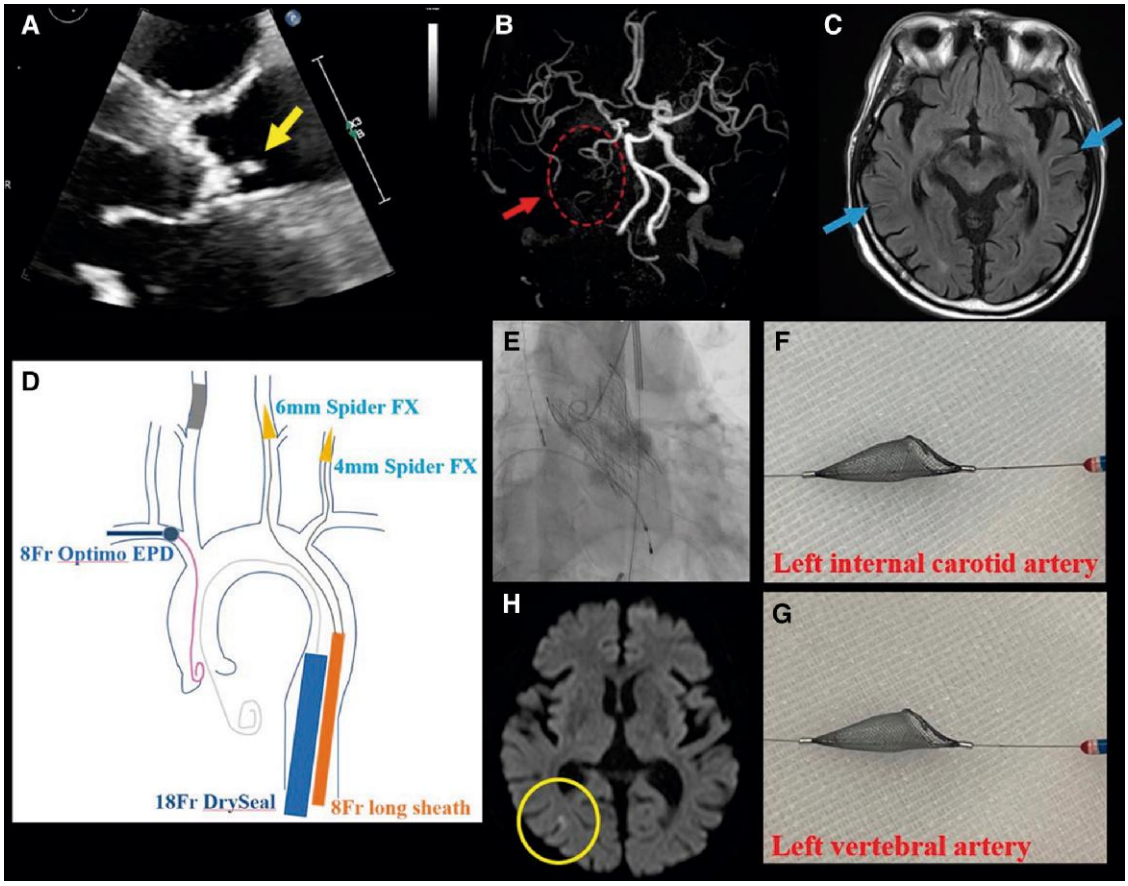

Figure 1 (*A*) Pre-operative transthoracic echocardiography showing a 7.5 mm high echoic mobile mass (arrow) attached to the calcification of the aortic valve on the non-coronary cusp. Pre-operative brain magnetic resonance angiography and magnetic resonance imaging showing (*B*) the occlusion of the right internal carotid artery (arrow) and (*C*) the intra-arterial signal (arrow) on fluid attenuated inversion recovery images. (*D*) Cerebral embolic protection strategy during transcatheter aortic valve replacement. Spider FX 6 mm and Spider FX 4 mm in the left internal carotid and the left vertebral arteries, respectively. An 8 Fr OPTIMO embolic protection device in the right subclavian artery. (*E*) Final angiogram during transcatheter aortic valve replacement. (*F* and *G*) No macroscopic materials in all filters after transcatheter aortic valve replacement. (*H*) Post-operative diffusion-weighted magnetic resonance imaging showing several small ischaemic lesions (circle). EPD, embolic protection device.

Consent: Written informed consent was obtained from the patient.

Conflict of interest: None declared.

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Data availability

Data sharing is not applicable. No new data were generated during the current study.

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