A Manual Carotid Compression Technique to Overcome Difficult Filter Protection Device Retrieval during Carotid Artery Stenting

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Background: We investigated the incidence of embolic protection device retrieval difficulties at carotid artery stenting (CAS) with a closed-cell stent and demonstrated the usefulness of a manual carotid compression assist technique. *Methods:* Between July 2010 and October 2013, we performed 156 CAS procedures using self-expandable closed-cell stents. All procedures were performed with the aid of a filter design embolic protection device. We used FilterWire EZ in 118 procedures and SpiderFX in 38 procedures. The embolic protection device was usually retrieved by the accessory retrieval sheath after CAS. We applied a manual carotid compression technique when it was difficult to navigate the retrieval sheath through the deployed stent. We compared clinical outcomes in patients where simple retrieval was possible with patients where the manual carotid compression assisted technique was used for retrieval. *Results:* Among the 156 CAS procedures, we encountered 12 (7.7%) where embolic protection device retrieval was hampered at the proximal stent terminus. Our manual carotid compression technique overcame this difficulty without eliciting neurologic events, artery dissection, or stent deformity. *Conclusions:* In patients undergoing closed-cell stent placement, embolic protection device retrieval difficulties may be encountered at the proximal stent terminus. Manual carotid compression assisted retrieval is an easy, readily available solution to overcome these difficulties. **Key Words:** Carotid artery stenting—difficult retrieval—filter protection device—manual carotid compression—proximal stent terminus.

Carotid artery stenting (CAS) is being evaluated as an alternative to carotid endarterectomy in high-risk patients.[1] Garg et al[2] and Touzé et al[3] reported that the incidence of stroke was lower in patients operated with than without embolic protection devices (EPDs), used to prevent embolic neurologic complications related to CAS. Standard CAS procedures are performed with the aid of distal EPDs. In Japan, a filter design device tends to be applied. The successful retrieval of EPDs is a determinant of procedural success because it is the last step in CAS. The close proximity of the EPD wire to an irregular stent or conformation of the stent to the artery can render navigation of the retrieval device through the deployed stent difficult.[4-6] We investigated the incidence of EDP retrieval difficulties and demonstrated the usefulness of a manual carotid compression assist technique to aid in the retrieval of EPDs.

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Received April 24, 2014; revision received July 17, 2014; accepted August 22, 2014.

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1052-3057/$ - see front matter

http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2014.08.022

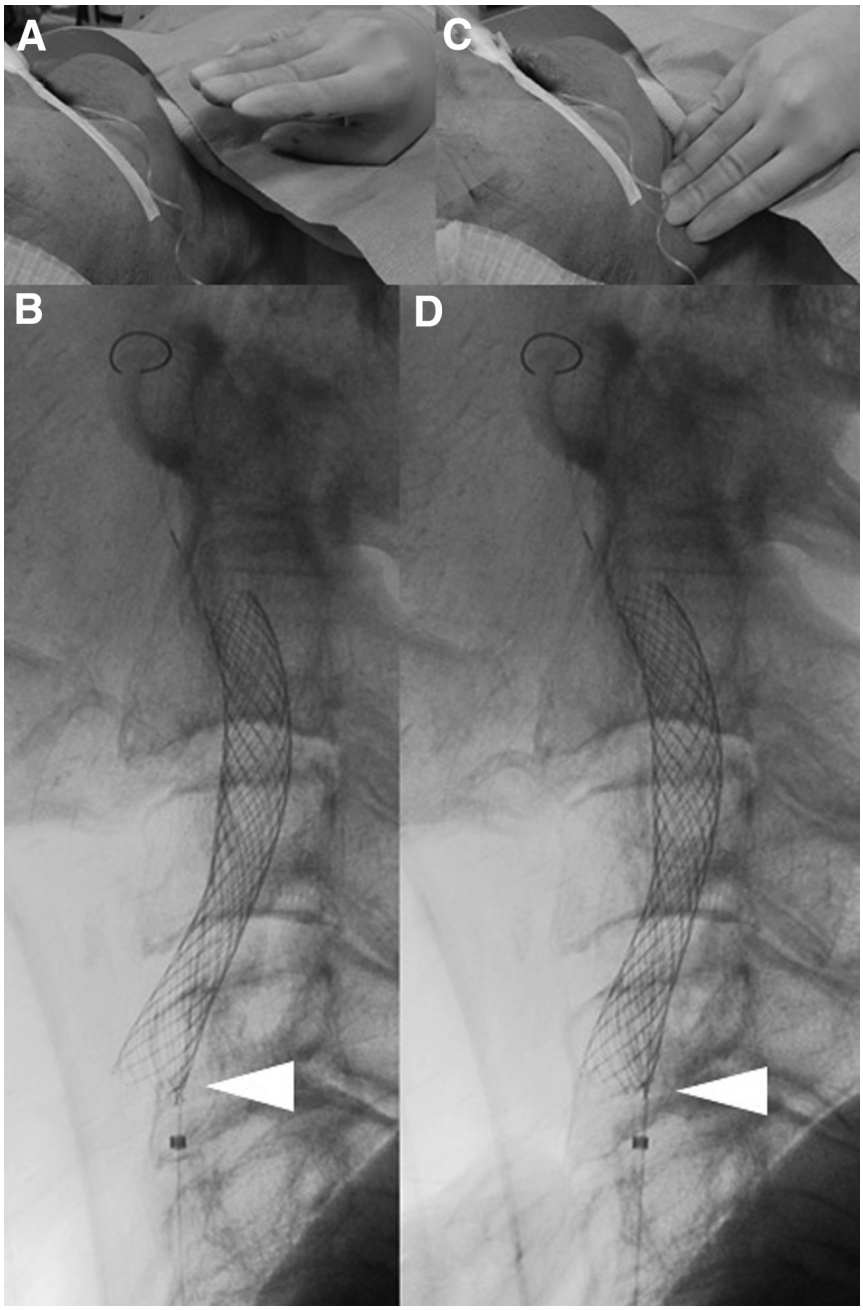

Figure 1. *Photographs and fluoroscopic images showing that the manual carotid compression technique changes the angle between the common carotid artery and stent. Advancement of the retrieval device is hampered by the proximal stent terminus (A, B: arrow head). The application of pressure at a site lateral or vertical to the neck straightens the stent and allows retrieval of the tight-fitting embolic protection device wire (C, D: arrow head).*

Materials and Methods

Between July 2010 and October 2013, we performed 156 CAS procedures with the aid of EPDs in patients with carotid atherosclerotic disease or stenosis. Indications for intervention were greater than 50% stenosis in symptomatic patients and greater than 80% stenosis in asymptomatic patients. For at least 3 days before CAS, all patients underwent oral antiplatelet treatment consisting of aspirin (100 mg daily) and clopidogrel (75 mg daily), or of cilostazol (200 mg daily).

All patients received heparin during the procedure to maintain an activated clotting time of more than 300 seconds under general anesthesia. They underwent standard CAS including the placement of filter design EPDs, predilation angioplasty, placement of a self-expandable closed-cell stent, and postdilation angioplasty if necessary (residual stenosis >20%). Filter design EPDs were used to treat all lesions. We used FilterWire EZ (Boston Scientific, Natick, MA) to treat 118 lesions. After the approval of the SpiderFX (eV3 Neurovascular, Irvine, CA), we used it to address the next 38 lesions. A Carotid WALLSTENT (Boston Scientific) was placed in all patients. After the CAS procedure, the EPDs were retrieved using the accessory retrieval sheath. When we encountered difficulties in navigating the retrieval sheath