Intraprocedural plaque protrusion resulting in cerebral embolism during carotid angioplasty with stenting

Hiroshi Aikawa · Tomonobu Kodama · Kouhei Nii
Masanori Tsutsumi · Masanari Onizuka · Minoru Iko
Shuko Matsubara · Housei Etou · Kimiya Sakamoto
Kiyoshi Kazekawa

Abstract An 82-year-old man with an asymptomatic left high-grade carotid stenosis was treated with carotid artery stenting (CAS) under distal protection. The procedure consisted with predilation with a 5 × 40 mm percutaneous transluminal angioplasty (PTA) balloon, deployment of a 10 × 20 mm self-expandable stent, post-dilation with a 7 × 20 mm PTA balloon, and aspiration of debris with 60 ml of blood. The cervical carotid angiogram immediately after deflation of the distal blocking balloon demonstrated a small in-stent filling defect of the contrast medium that protruded from the anterior wall of the carotid artery. The following cranial carotid angiogram showed abrupt occlusion of the left middle cerebral artery (MCA). Because the in-stent lesion had vanished in the repeat study after recognition of this embolic event, it was suggested that an embolus had been liberated from the in-stent lesion, reaching the left MCA and obliterating it. In this case, the embolus was speculated to originate in the ruptured plaque, which protruded into the stent through the cells of the device and became liberated into the bloodstream. Attention should be paid so as not to overlook any plaque protrusion, which may be seen subsequently as a cerebral embolism on the angiogram obtained immediately after CAS.

Key words Carotid angioplasty · Plaque protrusion · Plaque rupture · Cerebral embolism

Introduction Advances in techniques and instrumentation, resulting in the clinical application of various cerebral protection methods, render carotid angioplasty with stenting (CAS) safer. However, the substantial risk of thromboembolic complications persists as one of the most important issues to be resolved in this minimally invasive approach to addressing carotid artery stenosis.1,2 From February 2000 to March 2007, we treated 226 patients of ages 42–95 years (mean 71.9 years); the group included 183 men and 43 women whose carotid artery stenosis was treated by 256 CAS procedures. Among them, 127 procedures were performed for symptomatic lesions and 129 for asymptomatic lesions. All of the procedures except an early 15 cases were performed under the distal embolic protection using Naviballoon (Kaneka Medics, Osaka, Japan) or PercuSurge Guardwire system (Medtronic AVE, Danvers, MA, USA). In one patient (0.4%), we encountered an in-stent filling defect on the angiogram obtained immediately after the procedure. We posit that this patient’s cerebral embolism was due to intraprocedural plaque protrusion. To the best of our knowledge, this is the first angiographic documentation of plaque protrusion during CAS. Our report alerts the reader to this rare complication.

Case report An 82-year-old man was referred to us for endovascular treatment of an incidentally detected left internal carotid artery (ICA) stenosis. Initial diagnostic angiography demonstrated 85% ostial stenosis of the left ICA [North American Symptomatic Carotid Endarterectomy Trial
(NASCET) criteria] at the level of the cervical bifurcation (Fig. 1a). Axial computed tomography (CT) angiography 4.2 mm above the carotid bifurcation showed severe stenosis of the ICA with circumferential plaque (Fig. 2a). It demonstrated hypodense attenuation [∼20 Hounsfield units (HU)] with definite foci of very low density (<5 HU) in the neighboring slice (Fig. 2b). He undertook an oral antiplatelet regimen consisting of aspirin (100 mg daily) and clopidogrel (75 mg daily) for 5 days before the procedure.

The patient underwent CAS under general anesthesia. A bolus of 4000 units of heparin was administered just after the common femoral artery was accessed with an 8F sheath introducer; this prolonged the activated clotting time (ACT) to 290 s. An 8F guiding catheter coaxial with a 4F diagnostic catheter were advanced into the left middle cerebral artery.