Problems and Solutions Encountered on Endovascular Intervention of Tandem Internal Carotid Artery Stenosis

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Symptomatic carotid stenosis at multiple levels (tandem stenosis) accounts for 4.8% of all carotid diseases (1). It can cause both embolism and hemodynamic instability. It is difficult to determine what the actual symptomatic lesion is. However, correction of all of the specified tandem lesions is recommended (2).

A 45-year-old male patient applied to another health center three months ago with complaints of left arm and leg weakness. Intravenous thrombolytic therapy (IV tPA) was performed with acute ischemic stroke but did not benefit (Fig. 1 and 2). He was referred to endovascular

intervention for his right internal carotid artery (ICA) occlusion, and severe left ICA stenosis. There were hypertension and coronary artery diseases (by-pass recommended) in his history. He was using anti-hypertensive and antiaggregant drugs. His habits has no feature, but his brother and father had a story of death at young age. Diagnostic brain angiography (DSA) was performed. In the right ICA there was a current reported as an occlusion, but two lesions were detected in the cervical and intracranial petros segments (Fig. 3). The patient was scheduled for endovascular intervention. Informed consent form was taken from patient and his relatives.

Figure 1. Initial diffusion MR and ADC map of brain (a, b). Control diffusion MR and ADC map of brain one day after IV tPA administration (c, d).

Figure 2. ECA and ICA images taken by right carotid artery injection in DSA (a). Isolated ICA shows a proximal (cervical) and distal (intracranial) stenosis (tandem stenosis) (white arrow, b).

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Figure 3. Synchro wire (0.014) passed the lesion in the right intracranial petrosal segment of ICA (a), ICA is not observed in the imaging to locate the complete lesion for balloon angioplasty (b), the system is checked back and ECA is seen in the right common carotid artery injection while ICA is not observed (c), acute thrombosis of right ICA results total occlusion and the wire is inside (d).

Figure 4. Balloon angioplasty (a, b), stenting (c), and then the correction of proximal stenosis of the right ICA, and last recanalization image (d).

Figure 5. The right ICA is intended to intervene to narrow the intracranial stenosis, but the dissection develops (a), the dissection is corrected with drug-coated coronary stenting (b), and the final image of the tandem stenosis is complete (c).

Angioplasty was considered to the stenosis of intracranial petrosal segment under general anesthesia. The Envoy XB guiding catheter was placed on the right common carotid artery. Both lesions in the right ICA were passed with a 0.014 synchro guide wire. We wanted to show the lesion area for intracranial balloon angioplasty, but we could not. When the rear system was controlled, we detected that proximal complete occlusion of right ICA was developed. ICA revascularization was performed by balloon angioplasty, and then by carotid stenting (Fig. 4). After that, we placed ICA distal stenosis again. However, the lesion was difficult to pass because this time a dissection had developed in the stenotic area. A drug-coated coronary stent was applied to the stenosis and dissection all together (Fig. 5). As a result, tandem stenosis and its associated complications of ICA have been successfully corrected.

Our case was a patient who presented with acute ischemic stroke about three months ago, and had no clinical improvement despite IV thrombolysis. The resulting DSA was found to be critical stenosis at two levels –proximal and distal. The patient does not benefit from IV tPA, and this can be a result of tandem ICA lesions because the latter significantly reduce the response of systemic thrombolysis (2). In the patient for whom the procedure had to change from intracranial to extracranial, non-compliant balloon angioplasty was performed and then stented for a proximal ICA lesion. In the presence of intracranial stenosis, SAMMPRIS study showed that antiaggregant therapy is superior to intracranial stenting according to recent results (3). While avoiding from stenting intracranial stenosis, it was necessary because of newly developed dissection.

There are reports that endovascular intervention is successful and safe for tandem ICA lesions (4, 5). Our case has also been successfully treated.

However, it should be kept in mind that these events may have surprised complications, and should be treated in experienced stroke centers.

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