Hypoxia Accelerates Intra-plaque Neovascularization Derived from Endothelial Progenitor Cells in Carotid Stenosis

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Object The relationship between intraplaque hypoxia and IPH has been reported, but the details remain obscure. We aimed to clarify the relationship among intraplaque hypoxia, endothelial progenitor cells (EPCs), and neovascularization, which causes IPH. We assessed the histological findings of specimens obtained from CEA. Methods This study included 49 patients who underwent carotid endarterectomy. MRI was performed to analyze the components of the carotid plaques, and surgical specimens were subjected to immunohistochemical analysis. The number of hypoxia-inducible factor-1 alpha (HIF-1α), CD34-, CD133-, VEGFR-2-positive cells in the carotid plaques was quantified, as were the number and maximum diameter of CD31-positive microvessels. Results Plaque components were judged as fibrous in 7 samples, lipid-rich in 22, and IPH in 20. The number of CD34-, VEGFR-2-, and CD133-positive cells as EPC specific marker was significantly correlated with the number of HIF-1α-positive cells (r = 0.9, r = 0.82, and r = 0.81, respectively). These numbers varied among 3 plaque components (IPH > lipid-rich > fibrous). The number and maximum luminal diameter of CD31-positive microvessels were also significantly correlated with the number of HIF-1α-positive cells (r = 0.85 and r = 0.89, respectively) and varied among 3 plaque components (IPH > lipid-rich > fibrous). Conclusions The present findings suggest intra-plaque hypoxia may accelerate abnormal microvessel formation derived from EPCs, which in turn promotes IPH. The results also suggest that microvessels enlargement is a pivotal characteristic of IPH and these enlarged microvessels are immature endothelial tubes with disorganized branching and are fragile and prone to rupture.
INTRODUCTION
Intimal flap-like protrusion of the carotid artery is referred to as a carotid web (also known as carotid diaphragm and atypical fibromuscular dysplasia) that can cause recurrent ischemic stroke. We retrospectively studied the prevalence, demographics, clinical presentation, and imaging features of all patients in a series with defined carotid webs, and describe the treatment and histopathology of two that were symptomatic.

METHODS
This retrospective study analyzed data from a series of 505 patients who underwent head and neck computed tomography angiography (CTA) at Kyoto University Hospital between April 2011 and Oct 2016. Reports have indicated that CTA is reliable for detecting carotid webs, which are defined on images of oblique sagittal sections as a thin intraluminal filling defect along the posterior wall of the carotid bulb. Ultrasonic echo and MRI findings were also matched when available.

RESULTS
The prevalence of carotid webs in this series was 1.8% (9 of 505 patients), the mean age was 56 (range, 42 - 67) years, and six patients were women. Two (22.2%) of the nine patients with carotid webs had recurrent stroke and both were treated radically by carotid endarterectomy. The histopathological findings suggested fibromuscular dysplasia accompanied by early atherosclerotic changes.

CONCLUSIONS
The prevalence of carotid webs was low and they tended to occur more frequently among women in the present series.

Recurrent ischemic stroke might be caused by turbulent blood flow at the point of recess that leads to the formation of thrombus and emboli. We recommend that such patients undergo radical treatment.
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Initial experiences of neuroendovascular treatment through the right radial artery with 6Fr guiding sheath

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We have actively introduced the radial artery approach for less invasive endovascular treatment in cerebrovascular diseases. To confirm safety of transradial artery treatment with 6Fr guiding sheath, we retrospectively studied twenty patients who underwent endovascular treatment via the right radial artery using a 6Fr guiding sheath from September 2016 to June 2017. We investigated the age, sex, treatment side, procedure, sheath type, insertion method, time required for indwelling, sheath duration time, embolic events, hemostasis method, occlusion of the radial artery on the 2nd postoperative day. The average age was 71.8, 12 men, 8 females, 13 in right and 7 in left side. The carotid artery stent was carried out in 12 and the coil embolization in 8 cases. Types of the sheath were Medikit Axcelguide STIFF-J-1 in 18, Axcelguide straight in 2 cases. The insertion methods into the common carotid artery are the pulling-up method in 11 cases, the pushing-in method in 9 cases. The time taken from the radial artery puncture to the placement of the sheath was 23.6 minutes on average, the duration of indwelling was 85.8 minutes. In all cases, embolism was not observed by angiography just after sheath placement. The radial artery was not occluded in 19 cases on the 2nd postoperative day. Neuroendovascular treatment using 6Fr guiding sheath can be safely performed via the right radial artery by appropriately selecting the case.
Transbrachial angioplasty and stenting without crossing the aortic arch for right carotid artery stenosis patients with complex aortic plaques

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Objective A major risk associated with carotid artery stenting (CAS) is embolic event caused by disturbance of plaque in the aortic arch. To avoid it, we developed a novel and simple technique of transbrachial carotid angioplasty and stenting for right carotid stenosis patients without crossing the aortic arch.

Methods Six patients with complex aortic plaque were selected. A 6F guiding sheath was inserted via the right brachial artery. A steam-shaped 6F JB-2 diagnostic catheter with an acute “J”-shaped distal tip was used as the inner catheter. The JB2 catheter was advanced into the innominate artery. Under roadmap guidance, JB2 was pulled and cannulated in a common carotid artery, and a 0.035-inch guide wire was advanced to the distal common carotid artery without insertion into the external carotid artery. JB2 and guiding sheath were advanced to the distal common carotid artery. After JB2 removal, the usual carotid intervention was performed.

Results For all patients, technical success was achieved. No patient experienced a symptomatic stroke or cholesterol embolism after the procedure.

Conclusion Our novel and simple technique was safe and successful. This technique might prevent embolic stroke and dislodgement of cholesterol from atherosclerotic aortic arch plaques during neurointervention.
Treatment outcome of CAS for CEA high risk and CEA for CAS high risk

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The treatment outcome of CEA for CAS high risk and CAS for CEA high risk is not understood enough. We retrospectively studied for 227 patients who underwent CEA or CAS for carotid artery stenosis and reviewed the CEA high risks and CAS high risks. We examined the treatment outcome of CEA for CAS high risk and risk factors due to perioperative complications in both treatment. CEA and CAS were 89 cases, 138 cases, respectively. CEA for CAS high risk was performed in 77 patients. The treatment outcome of CEA for CAS high risk was cerebral infarction 2.6%, systemic complications 7.8%, and death 1.1%. CAS for CEA high risk was performed in 101 patients. The treatment outcome of CAS for CEA high risk was cerebral infarction 7.9%, cerebral hemorrhage 1.0%, and systemic complications 4.0%. Postradiation therapy (OR=20.9, p=0.017) and multiple antithrombotic therapy (OR=12.0, p=0.065) were involved with cerebral infarction in CAS for CEA high risk by the multivariable analysis. Both treatment modalities were tolerable treatment outcome. CAS for postradiation therapy and multiple antithrombotic therapy has a high risk of cerebral infarction, therefore, it is necessary to examine treatment contents and modality.
Surgical outcome of Carotid Endarterectomy: Technical Report for High-cervical Lesion

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OBJECTIVE: Carotid endarterectomy (CEA) for high cervical internal carotid artery stenosis is considered to be technically demanding because of the difficulty to dissect the distal end. We report the surgical technique and outcome of CEA for high-cervical lesion performed in our institution.

METHODS: We retrospectively analyzed the records of 98 patients treated by CEA from December 2013 to June 2019. The plaque positions rostral to the C2 vertebral level was defined as the high-cervical lesions (n = 34).

RESULTS: Postoperative new asymptomatic ischemic lesion was detected as high as 4% and 3%, in high-cervical group and non high-cervical group, respectively. Symptomatic ischemic lesion was detected in 2% and 0% of the each group above. Cranial nerve palsy (CN.XII) was confirmed in 3% in both groups. Deterioration of the modified Rankin Scale was observed in 7% in both groups. Morbidity was as low as 0% and 1% respectively.

CONCLUSION: Successful expose the distal end of the plaques included following elements:

① Skin incision was designed along the skin folds, and extended toward the posterior border of the mastoid process. ② The great auricular nerve was maximally exposed and preserved to secure the surgical field. ③ The sternocleidomastoid muscle (SCM) was dissected from the parotid gland, which allowed counter-retraction between SCM and the lower jaw. ④ The internal deep cervical lymph nodes around internal jugular vein was resected. ⑤ Digastric muscle, CN.XII, and occipital artery (OA) were retracted toward parietal side using vascular tapes, if necessary, OA can be cut.