The Evolution in Carotid Stenting

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Carotid stenting plays an important role for the treatment of carotid stenosis. The evolution in the field of carotid stenting (approach, imaging technique, stent design, protective devices and perioperative management) wrought improved clinical outcome. Precise details and examples of clinical application will be discussed in this lecture.
Advantage of Carotid endarterectomy and carotid artery stenting: In terms of hybrid neurosurgeon

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Objective: Carotid endarterectomy (CEA) is employed for the carotid artery stenosis all over the world. Surgical procedure has been established. However, there are some severe complications and pitfalls. Carotid artery stenting (CAS) in high-surgical-risk patients is considered as an effective alternative to CEA. We report our clinical experience of CEA and CAS, and discuss the advantage and disadvantage of the each treatment.

Materials and Methods: For 13 years, we performed CEA for 133 patients (135 lesions) and CAS was performed for 127 patients with carotid artery stenosis (129 lesions). Perioperative imaging studies and post-operative condition were evaluated especially in terms of complication.

Results: In our CEA series, ischemic stroke occurred in 3 cases, myocardial infarction in one, cranial nerve palsy in 2, internal carotid artery occlusion in 1, wound hematoma in 2, hyperperfusion syndrome in 3. The procedure was halted because of internal-shunt problem. All CAS was successfully performed. Ischemic stroke occurred in 7 cases, hyperperfusion syndrome in 2, stent occlusion in 2 and puncture site hematoma in 2.

Conclusions: CEA is a first-line treatment for the carotid artery stenosis. However, the complication of CEA may result in severe situation. Recognizing pitfalls, careful perioperative management is required. The result of CAS is as comparable as that of carotid endarterectomy. The radiological evaluation for the quality of plaque and appropriate selection of the embolus protection device are important.
Efficacy of staged angioplasty for the patients at high risk of hyperperfusion syndrome

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INTRODUCTION:
Intra-cranial hemorrhage caused by hyperperfusion syndrome (HPS) is rare but well-known fatal complication after carotid artery stenting (CAS). To prevent this complication, we have introduced staged angioplasty (SAP) for the high risk patient of HPS since 2008. We analyzed the result of CAS comparing with before and after introduction of SAP.

MATERIALS & METHODS:
Between 2002 and 2017, a total 235 cases of CAS were performed in our institution. Sixty-three patients were included in pre-SAP period, and 172 were in SAP period. In SAP period, HPS high risk patients were assessed by using quantitative SPECT evaluation with Acetazolamide challenge. SAP method was initially performed angioplasty only using 3mmm balloon for carotid stenosis, followed by delayed CAS (2-4 weeks later).

RESULTS:
SAP was performed in 21 patients (12.1%) among 173 cases during SAP period. One patient suffered from intracranial hemorrhage due to HPS in pre-SAP period, but none was in SAP period. Periprocedural complication rates were 3/63 (4.7%) in pre-SAP period, 8/173 (4.6%) in SAP period, and 1/21 (4.7%) in SAP group retrospectively.

CONCLUSION:
Since SAP introduction, no HPS hemorrhage has occurred. Periprocedural complication rates were no difference between SAP and regular CAS group. SAP is useful method for the patients at high risk of HPS.
Carotid Endarterectomy  -Technique and Outcome-

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Carotid endarterectomy (CEA) is recommended in symptomatic and asymptomatic patients with severe carotid artery stenosis. CEA is an essential surgical technique for neurosurgeons. In this paper, I provide an outline of the CEA technique to be used according to the anatomical findings, including how to dissect the distal internal carotid artery in the high position stenosis. Since carotid patch angioplasty is preferred technique for primary closure, therefore, I describe in detail how to perform patch angioplasty.
Carotid Artery Stenting Progress to Date and Next Steps

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Carotid artery stenting (CAS) is alternative to carotid endarterectomy (CEA) with promised long-term efficacy. Patients indicated for carotid revascularization often have systemic atherosclerotic disease, therefore CAS has advantage to reduce the periprocedural systemic complications including myocardial infarction via its less invasiveness. However, recent large randomized control trials have revealed CAS has higher potential risk of periprocedural ischemic stroke. The main factor to participate this event will be incomplete embolic protection during balloon or stent angioplasty, and post-procedural thrombus emerges on the stented area associate to the protrusion material through bare metal stent. In this article, we present an outline of recent randomized control trials of SPACE, EVA-3S, ICSS, CREST and ACT-1 focused on cerebral ischemic complications of these trials, and describe the detail of the mechanism of periprocedural thromboembolic events and their countermeasure. Reduce of periprocedural ischemic complication is the task to date, and active utilization of proximal balloon embolic protection to unstable plaque on Taylor-maid manner and newly developed Micro Mesh-Covered stent may affect the efficacy of CAS as we go forward.