Stent-assisted coiling case series

A total of 102 patients who received endovascular treatment for acute subarachnoid hemorrhage between January 2011 and December 2017 were enrolled. The Stent-assisted coiling (SAC) technique was performed in 38 of these patients, whereas the no-stent coil embolization (NSC) technique was performed in 64. The safety and efficacy of the SAC technique in acute SAH was evaluated as compared with the NSC technique by retrospective analysis of radiological and clinical outcomes.

There were no significant differences in clinical or angiographic outcomes between the SAC and NSC techniques in patients with acute aneurysmal subarachnoid hemorrhage. The rate of intracranial hemorrhage after ventriculostomy was higher in the SAC group than that in the NSC group (63.6% vs 12.5%; OR 12.25, 95% CI 1.78-83.94, p = 0.01). However, all these complications were asymptomatic and so small that they were only able to be diagnosed with imaging.

Ruptured wide necked aneurysms could be effectively and safely treated with the SAC technique, which showed clinical and angiographic outcomes similar to those of the NSC technique. Hence, the SAC technique with dual antiplatelet therapys may be a viable option even in acute SAH [1].

Clinical data of 96 patients with vertebral artery dissection aneurysm (VDAs) treated by LVIS stent and Enterprise stent assisted coil were analyzed retrospectively between January, 2013 and June, 2017.Of all, the LVIS Stent-assisted coiling was performed in 28 patients (LVIS-stent group) and Enterprise in 68 patients (Enterprise-stent group). The clinical and imaging follow-up were performed. The instant embolization rate, complications, and recurrence rate were analyzed and compared between the two groups.

Instant angiographic results:in the LVIS stent group, complete occlusion was achieved in 17 VDAs (60.7%), near-complete occlusion in 10VDAs (35.7%), and partial occlusion in 1 VDA (3.6%). In the Enterprise stent group, complete occlusion was achieved in 27 VDAs (39.7%), near-complete occlusion in 34VDAs(50.0%), partial occlusion in 7VDAs (10.3%). Procedure-related complications occurred in 3 patients (10.7%) in LVIS stent group and 3 patients (4.4%) in Enterprise stent group. DSA follow-up was performed during 6 to 12 months after surgery, and 10 patients with vertebral artery dissection aneurysm recurred, 2 in the LVIS group and 8 in the Enterprise stent group. The latest modified Rankin Scale score was 0 in 55 patients,1 in 13, 2 in 1, 3 in 1, and 6 in 1. Among them, all follow-up patients in the LVIS stent group had good prognosis, while in the Enterprise stent group, 50 patients (94.4%) had a good prognosis.

The Stent-assisted coiling have a higher degree of embolization in the vertebral artery dissection aneurysms, a higher rate of near-total embolization, a lower incidence of neurological complications, and a good prognosis. The complete and near-complete occlusion rates and the incidence of neurological complications in the LVIS group was higher than that in the Enterprise group and the recurrence rates in the LVIS group was lower than that in the Enterprise group, both with no statistically significant difference [2].

2017

Between September 2012 and June 2016, a total of 463 intracranial aneurysms were treated by stent-

assisted coil embolization. Of these, 132 small saccular aneurysms displayed saccular filling with contrast medium in the immediate aftermath of coiling. Progressive thrombosis was defined as complete aneurysmal occlusion at the 6-month follow-up point. Rates of progressive occlusion and factors predisposing to this were analyzed via binary logistic regression.

In 101 (76.5%) of the 132 intracranial aneurysms, complete occlusion was observed in follow-up imaging studies at 6 months. Binary logistic regression analysis indicated that progressive occlusion was linked to smaller neck diameter (odds ratio [OR] = 1.533; p = 0.003), hyperlipidemia (OR = 3.329; p = 0.036) and stent type (p = 0.031). The LVIS stent is especially susceptible to progressive thrombosis, more so than Neuroform (OR = 0.098; p = 0.008) or Enterprise (OR = 0.317; p = 0.098) stents. In 57 instances of progressive thrombosis, followed for ≥12 months (mean 25.0 ± 10.7 months), 56 (98.2%) were stable, with minor recanalization noted once (1.8%) and no major recanalization.

Aneurysms associated with smaller diameter necks, hyperlipidemic states and LVIS stent deployment may be inclined to possible thrombosis, if occlusion immediately after stent-assisted coil embolization is incomplete. In such instances, excellent long-term durability is anticipated [3)].

2015

Over a 10-year period, a single surgeon treated 486 aneurysms with SAE in which open-cell Neuroform or closed-cell Enterprise stents were used. Single stents were used in 386 cases, overlapping stents were deployed in 80 cases, and Y-configuration stents were used in the remaining 20 cases. All neurological complications, which included transient deficits, were analyzed; disabling strokes and death were considered major complications. The chi-square test and multivariate logistic regression were used to evaluate the influence of aneurysm size and morphology, aneurysm location, stent selection, and stent configuration on complication rates.

There were 7 deaths (1.4%), 9 major strokes (1.9%), and 18 minor neurological complications (3.7%). For all complications, multivariate analysis revealed that large aneurysm size (10-25 mm; p = 0.01), giant aneurysm size (> 25 mm; p = 0.04), fusiform aneurysm morphology (p = 0.03), and using a Y-configuration stent (p = 0.048) were independent risk factors. For the major complications, independent risk factors included an aneurysm in the posterior circulation (p = 0.02), using an overlapping stent configuration (p = 0.03), and using a Y-configuration stent (p < 0.01). In this series, SAE for cerebral aneurysm treatment carried an acceptable complication rate. With continued innovations in techniques and devices and with increased experience, the complication rates associated with SAE may be even lower in the future [4)].

2014

In 72 patients included in this study, periprocedural complications occurred in 14 (19.4%), including asymptomatic complications in 4 (5.6%) and symptomatic complications in 10 (13.9%); there were symptomatic thromboembolic complications in 5 patients (6.9%), and symptomatic hemorrhagic complications in 5 (6.9%). The authors observed no subacute or delayed thromboembolic complications during the follow-up period of 18.8 months. Use of external ventricular drainage (EVD) (OR 1.413, 95% CI 0.088-2.173; p = 0.046) was the only independent risk factor for periprocedural complications on multivariate logistic regression analysis.

The periprocedural complication rate during SAC was 19.4% among 72 patients. Because of the high complication rate, microsurgical clipping or endovascular treatment with another technique (multiple-microcatheter or balloon-assisted technique) may be a more appropriate option for first-line treatment than SAC, especially in patients requiring EVD [5].

1)
Roh H, Kim J, Bae H, Chong K, Kim JH, Suh SI, Kwon TH, Yoon W. Comparison of stent-assisted and no-stent coil embolization for safety and effectiveness in the treatment of ruptured intracranial aneurysms. J Neurosurg. 2019 Aug 30:1-7. doi: 10.3171/2019.5.JNS19988. [Epub ahead of print] PubMed PMID: 31470411.
2)
Wang LY, Feng X, Zhang BR, Ma N, Guo EK, Peng F, Tong X, Liu AH. [Efficacy analysis of LVIS and Enterprise stent assisted coil in the treatment of vertebral artery dissection aneurysm]. Zhonghua Yi Xue Za Zhi. 2019 Mar 5;99(9):685-689. doi: 10.3760/cma.j.issn.0376-2491.2019.09.010. Chinese. PubMed PMID: 30831618.
3)
Lim JW, Lee J, Cho YD. Progressive Occlusion of Small Saccular Aneurysms Incompletely Occluded After Stent-Assisted Coil Embolization : Analysis of Related Factors and Long-Term Outcomes. Clin Neuroradiol. 2017 Aug 8. doi: 10.1007/s00062-017-0612-x. [Epub ahead of print] PubMed PMID: 28791434.
4)
Johnson AK, Munich SA, Tan LA, Heiferman DM, Keigher KM, Lopes DK. Complication analysis in nitinol stent-assisted embolization of 486 intracranial aneurysms. J Neurosurg. 2015 May 15:1-7. [Epub ahead of print] PubMed PMID: 25978711.
5)
Chung J, Lim YC, Suh SH, Shim YS, Kim YB, Joo JY, Kim BS, Shin YS. Stent-assisted coil embolization of ruptured wide-necked aneurysms in the acute period: incidence of and risk factors for periprocedural complications. J Neurosurg. 2014 May 16:1-8. [Epub ahead of print] PubMed PMID: 24834945.