LVIS stent case series

A multicenter, retrospective, observational study was conducted on patients who had intracranial aneurysms treated with the LVIS EVO stent across 3 Australian neurovascular centers between February 2020 and September 2020. Short-term technical and clinical outcomes were evaluated.

Results: A total of 22 LVIS EVO stents were successfully implanted to treat 15 aneurysms (3 ruptured, 12 unruptured) in 15 patients. Aneurysms ranged from 2 mm to 35 mm in dome height. The LVIS EVO stent was used for stent-assisted coiling in 11 patients and flow diversion in 4 patients. There were no device-related procedural complications. There were 2 cases of peri-procedural symptomatic thromboembolic complications and no procedure-related mortality. At early radiological follow up, 10 patients had complete occlusion, 4 patients had small neck remnants, and 1 patient who was managed with flow diversion had a residual aneurysm.

Conclusion: Early experience with the LVIS EVO stent demonstrated safety and feasibility for stent-assisted coiling as well as flow diversion for intracranial aneurysms. In this heterogeneous cohort, including ruptured, complex, and large aneurysms, all cases were technically successful [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)].

A total of 92 patients who underwent endovascular treatment of MCA aneurysms with LVIS stent or non-LVIS stent were included in the present study. The clinical presentation, aneurysmal characteristics, technical feasibility, procedural complications, as well as angiographic and clinical

follow-up results were analyzed. The computed tomography scan demonstrated that endovascular treatment with LVIS stent markedly reduced pre-operative and intra-operative ruptures. It was indicated that endovascular treatment with LVIS stent resulted in less post-operative symptoms and cases of disability according to the modified Rankin scale score. In conclusion, the present outcomes provide evidence that endovascular treatment with an LVIS stent is an efficient method for the treatment of MCA aneurysm [3].

Patients with ruptured intracranial aneurysms treated with double LVIS stents at the First Affiliated Hospital of Wenzhou Medical University, Zhejiang Province, China between November 2014 and May 2016 were reviewed. The clinical data and technical results are presented.

Ten patients with 15 aneurysms were treated with double LVIS stents, with a 100% technical success rate. No mortality was observed. Immediate angiographic outcome evaluation showed complete occlusion in 13 aneurysms (86.7%) and neck remnants in 2 aneurysms (13.3%).

Double LVIS stents are safe and effective in the treatment of intracranial aneurysms, especially complex aneurysms [4].

Vakharia et al., presented a patient requiring stent-assisted coiling of an anterior communicating artery aneurysm in whom a stent anchor technique was used to reduce a microcatheter loop within an aneurysm dome before coil embolization. Postembolization angiographic runs showed complete coil occlusion of the aneurysm with approximately 35% packing density.The video can be found here: https://youtu.be/zHR1ZOArUro [5].

The clinical data of 41 patients with intracranial aneurysms , which were performed in LVIS Stent-assisted coiling endovascular therapies from June 2015 to October 2017 in The First Affiliated Hospital of Bengbu Medical College were analyzed retrospectively. 13 patients were unruptured intracranial aneurysm and 28 patients were ruptured intracranial aneurysm. Immediate angiography outcomes and follow-up angiography outcomes were assessed by DSA. Clinical outcomes were evaluated by modified Rankin Scale (mRS).

The LVIS stents were successfully delivered in 39 cases, however there were 2 cases in which the LVIS stents did not fully open.The technical success rate was 95.1%(39/41). There were 2 cases had complications during perioperation, the rate of complications was 4.9%(2/41). One was thrombus formation in operation, there was no nerve function defect.The other was infarction three days after operation and which had mild function defect (mRS grade 2). Raymond Roy occlusion classification grade 1 was 31 cases, Grade 2 was 2 cases , grade 3 was 8 cases, the effective embolism rate was 80.5%(33/41). Mean follow up time was 14.4 months, 32 cases were cured, the cure rate was 78.0%(32/41), 2 cases were reappeared, the recurrence rate was 4.9%(2/41). mRS grade 0 was 16 cases, grade 2 was 24 cases , grade 2 was 1 case , the cure rate of clinical symptom is 100%.

LVIS stent-assisted coiling is safe and effective in the treatment of cerebral aneurysms [6].

A retrospective review of the aneurysm database identified 37 patients with intracranial carotid artery

BBAs treated by overlapped stenting in our institution from June 2013 to June 2016. The clinical characteristics and angiographic results were reviewed.

Overlapped stenting combined with coiling were applied in 37 BBAs, including LVIS stents in 18 cases and non-LVIS stents in 19. For the LVIS group, angiographic results at 3-24 months were complete occlusion in 15 cases (83.3%), improved in 2 cases (11.1%), and recanalized in 1 case (5.6%). The modified Rankin Scale scores at 3-36 months' follow-up were 0-2 in 15 cases (83.3%) and 3-6 in 3 cases (16.7%). For the non-LVIS group, angiographic results at 3-46 months were complete occlusion in 12 cases (63.2%) and recanalized in 7 cases (36.8%). Clinical outcomes at 6-58 months were modified Rankin Scale scores of 0-2 in 17 cases (89.5%) and 3-6 in 2 cases (10.5%). Use of the LVIS stent was less likely to result in recanalization (odds ratio 0.10, 95% confidence interval 0.01-0.93, P = 0.042) than the non-LVIS stent. The LVIS group had a lower average number of stents than did the non-LVIS group (2.2 vs. 2.6, P = 0.016). In terms of complication rate (11.1% vs. 5.3%, P = 0.604), good outcome rate (83.3% vs. 89.5%, P = 0.660), and immediate angiographic result (P = 0.424), no statistically significant difference between the 2 groups was found.

Overlapped LVIS stenting combined with coiling is feasible and safe for BBAs. Overall, the LVIS stent provided less risk of BBA recurrence compared with the non-LVIS stent and did not increase the risk of procedure-related complications [7].

From November 2014 to December 2015, total 190 patients with 208 unruptured intracranial aneurysms were coiled assisted by LVIS and Enterprise stents. Procedure-related complications, clinical outcomes, and angiographic results were analyzed retrospectively.

A total of 92 patients with 96 aneurysms received LVIS stents and 98 patients with 112 aneurysms were treated with Enterprise stents. Procedure-related complications occurred in 10.9% of patients (2 hemorrhagic events and 8 thromboembolic events) in the LVIS stents group whereas 16.3% (1 hemorrhage, 1 mass effect, and 14 thromboembolic events) in the Enterprise stents group. No statistical significant differences in thromboembolic (P = 0.263), hemorrhagic complications (P = 0.611), and favorable clinical outcomes (modified Rankin Scores of 0-2) (P = 0.379) were found between 2 groups. A greater initial complete or near-complete obliteration was found in the LVIS stents group compared with the Enterprise stents group (96.9% vs. 88.4%, P = 0.034). Larger aneurysm size (P = 0.048) was an independent predictor of procedure-related complications in univariate analysis.

Compared with Enterprise stents, LVIS stents may achieve greater complete or near-complete occlusion rate. There was no significant difference in procedural-related complications and clinical outcomes between LVIS and Enterprise stents [8].

A retrospective analysis was performed of 32 cases comprising 34 aneurysms in which the LVIS Jr device was used for stent-assisted coil embolization of intracranial aneurysms from February to October 2012, including all clinical and angiographic data as well as mid-term follow-up (1-12 months of treatment).

The median age of the patients was 54 years (range 21-76) and 19 (59%) were women. The aneurysms were ruptured in 12/34 cases (35.3%); 26 (76.4%) were located within the anterior circulation and the remaining 8 (23.5%) were located in the posterior circulation. Eleven of the 34 aneurysms (32.3%) were treated with a Y-stent configuration. Immediate total occlusion was

observed in 16/34 (47%), near total occlusion (90-95%) in 5/34 (14.7%) and a 'dog ear' or subtotal occlusion in 12/34 (35.2%). A single aneurysm was treated without coil embolization. Complications occurred in 5/34 cases (15%), including two cases of in-stent thrombosis.

Implantation of the LVIS Jr device as a support device for stent-assisted coil embolization seems to be safe and effective. The LVIS Jr device can also be implanted in a Y-stent configuration, offering a novel technique with a potentially lower risk of thromboembolic complications compared with other devices [9)].

IRB approved single-center interventional clinical study in 22 patients (10 females, 12 males, mean age 55, age range 33-74 years) for the endovascular treatment of wide-neck aneurysms. After obtaining informed consent, patients were included according to the following criteria: aneurysm fundus-to-neck ratio < 2 or neck diameter > 4 mm, and a parent vessel diameter of ≤3.5 mm. Primary end point for clinical safety was absence of death, absence of major or minor stroke, and absence of transient ischemic attack. Primary end point for treatment efficacy was complete angiographic occlusion according to the Raymond-Roy Occlusion Classification (RROC) immediately after the procedure and at follow-up after 3 and 6 months on magnetic resonance imaging (MRI).

In 20/22 (91 %) of patients, the primary end point of safety was reached; in the two remaining patients, transient ischemic attack, but no permanent deficit was observed; in 16/22 (73 %), efficient occlusion (RROC1) was reached, and in 6/22 (27 %), a residual neck remained (RROC2). Single [seven with antegrade, two in crossover configuration, and four with “first-balloon-then-stent” (FBTS) technique] or double-stent (eight patients with Y configuration and one patient with X configuration) deployment was technically successful in all cases.

Deployment of the LVIS Jr. microstent in various single- or double-stent configurations is safe and effective to assist the treatment of intracranial wide-neck aneurysms [10)].

Dissecting and wide-necked aneurysms that incorporate a large portion of the parent artery can be challenging to treat with currently available devices. This study reports three cases treated with a new hybrid stent design that incorporates a smaller cell size and more pliable design than current generation stents and results in some flow diversion characteristics.

In all three cases, use of the low-profile visible intraluminal support (LVIS) device in conjunction with coil embolization was determined to provide the best opportunity to achieve aneurysm occlusion while mitigating adverse events. The institutional review board reviewed all cases and approval was obtained. All cases were performed under emergent use exemption from the US Food and Drug Administration.

All three patients were successfully stent coiled with the LVIS device. One patient was completely occluded initially and remained so at follow-up, one patient progressed to complete occlusion at follow-up, and the last patient had stable incomplete occlusion of their fusiform aneurysm. There were no complications related to the procedures and the patients were maintained on dual-antiplatelet therapy.

The LVIS device offers promise as a stent-assisted coil device with certain characteristics that may be advantageous over currently available microstents [11)].

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