Low-Profile Visualized Intraluminal Support Device (LVIS Jr) for the Treatment of Intracranial Aneurysms

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CNS 2016 ANNUAL MEETING
San Diego CALIFORNIA
SEPTEMBER 24-28, 2016

Introduction

Early case series suggest that the recently introduced Low-Profile Visualized Intraluminal Support Device (LVIS Jr) may be used to treat wide-necked aneurysms that would otherwise require treatment with intra-saccular devices or open surgery. We report the first North American single-center experience utilizing LVIS Jr to treat intracranial aneurysms involving 1.8-2.5mm parent arteries.

Learning Objectives

• The LVIS Jr stent may be used to treat a variety of intracranial aneurysms involving small parent arteries that would otherwise require treatment with intra-saccular devices or open surgical clipping.

• Early experiences suggest that the LVIS Jr device may be used for stand-alone treatment by flow diversion of aneurysms in selected cases.

Methods

We retrospectively examined patients with ruptured, incidental or recurrent aneurysms treated with the LVIS Jr stent over a one-year period. Aneurysms were treated by stent-assisted coiling (SAC) or stand-alone stent placement. Angiographic occlusion was graded by consensus scale for SAC, or expanded Raymond-Roy score for flow diversion. Good functional outcome was defined as Modified Rankin score = 2 or less.

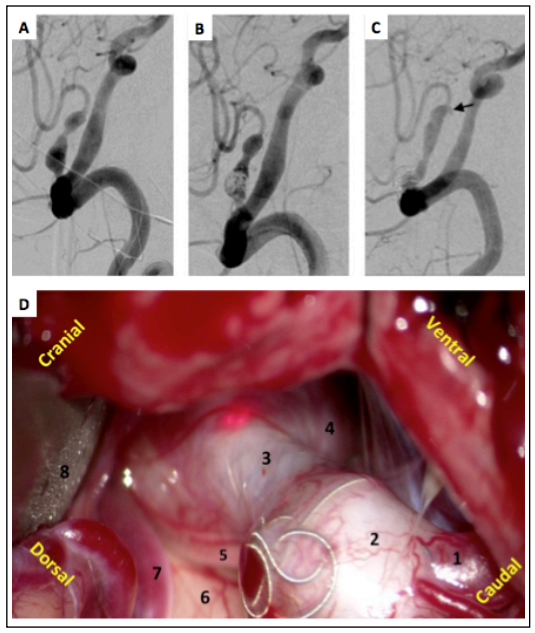

Figure 1: Stent-assisted coiling and subsequent clip ligation of PICA aneurysm.
Lateral posterior circulation angiogram demonstrating ruptured right PICA aneurysm with fusiform dissection, (A) before and (B) after stent-assisted coiling with LVIS Jr. (C) Six-month angiogram revealed delayed type 1b endoleak with dissection extending beyond stent (arrow). (D) Intraoperative photograph of far lateral exposure of delayed recurrent lesion demonstrating (1) proximal PICA, (2) previously coiled aneurysm, (3) stent, (4) recurrent aneurysm, (5) glossopharyngeal nerve, (6) posterior lateral surface of medulla, (7) distal PICA, and (8) retracted cerebellum.

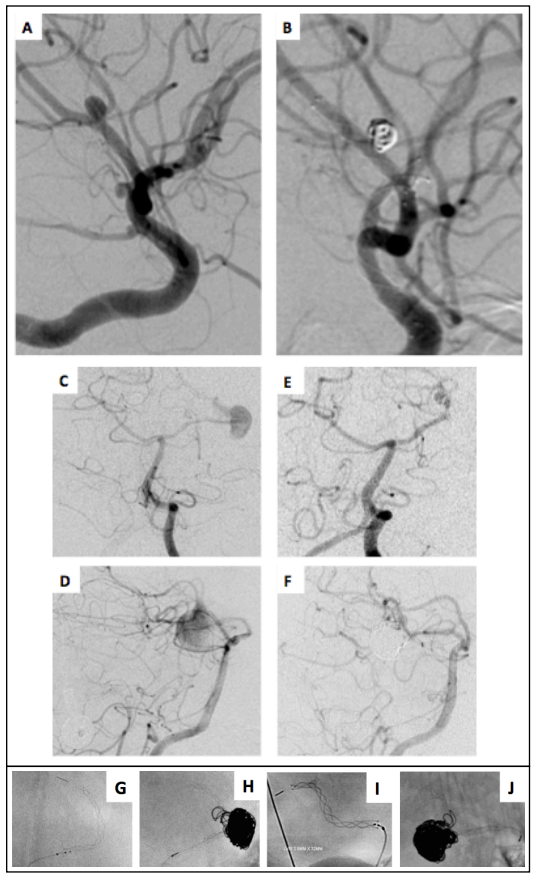

Figure 2: Stent-assisted coiling and flow diversion with LVIS Jr.
(A) Right anterior circulation angiogram of a patient with right MCA bifurcation, ICA terminus, and PCOM blister aneurysms. (B) Complete MCA aneurysm obliteration after stent-assisted coiling, and complete occlusion of PCOM and ICA terminus aneurysms after flow diversion. (C, D) Posterior circulation angiograms of a patient with a giant fusiform left PICA aneurysm. (E, F) Complete aneurysm obliteration after stent-assisted coiling. (G-J) Unsubtracted images of stent and coil reconstruction of parent vessel.

Results

A total of 21 aneurysms were treated in 18 patients. Aneurysms were 2-25mm in diameter; one was ruptured, while three had recurred after previous rupture and treatment. Lesions were distributed across the anterior (n=12) and posterior (n=9) circulations. Three were fusiform morphology. Stent deployment was successful in 100% of cases with no immediate complications. Seventeen aneurysms were treated with SAC, with immediate complete occlusion in 94.1%. Only one case required further treatment: a fusiform dissecting aneurysm treated with elective clip ligation after delayed extension (Figure 1). Four aneurysms were treated by flow diversion, and complete occlusion was achieved in three cases (Figure 2). Small foci of delayed ischemic injury were noted in two patients: one was asymptomatic, and another experienced transient deficits in the setting of medication noncompliance. No in-stent stenosis, migration, hemorrhage, or permanent deficits were observed. Good functional outcome was achieved in 100% of cases.

Conclusions

Our experience suggests that the LVIS Jr stent may be used for a variety of intracranial aneurysms involving small parent arteries, with excellent angiographic and clinical outcomes. Future studies may build upon our experiences with flow diversion and treatment of complex lesions.