



Case Report

Blister-like aneurysm of the anterior communicating artery treated with only Low-profile Visualized Intraluminal Support Junior stent

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ABSTRACT

Background: Endovascular treatment is becoming a mainstream treatment for blister-like aneurysms in recent years. Blister-like aneurysms are usually located in the internal carotid artery, whereas that of the anterior communicating artery (AcomA) are very rare. We report the first case of blister-like aneurysm of AcomA that was treated solely with a neck bridging stent that resulted in complete occlusion without complication.

Case Description: A 50-year-old woman was admitted to our hospital due to a subarachnoid hemorrhage. Digital subtraction angiography showed a very small aneurysm in the dorsal side of the AcomA. We considered it a blister-like aneurysm based on its size and shape. She underwent endovascular treatment under general anesthesia on day 15 after vasospasm period. Dual antiplatelet therapy was administered 1 week prior. A Low-profile Visualized Intraluminal Support Junior stent was implanted from the left A2 to the right A1, covering the AcomA. The postoperative course was uneventful, and she was discharged with no neurological deficit. The aneurysm remained unchanged on postoperative day 14; however, complete occlusion was achieved 3 months after the treatment.

Conclusion: Monotherapy with a neck bridging stent is an effective treatment option for blister-like aneurysms. Treatment with a single stent could achieve complete occlusion especially if the aneurysms occur elsewhere than the internal carotid artery. We should consider immediate additional treatment if the aneurysm grows within 1 month after initial treatment.

Keywords: Anterior communicating artery, Blister-like aneurysm, Neck bridging stent

INTRODUCTION

Blister-like aneurysms are rare subtype that has the characteristics of a wide neck and dissecting appearance. They have a high tendency for perioperative rebleeding due to fragile walls. Most of the blister-like aneurysms are located in non-branching sites of the internal carotid artery.^[1,2] Other sites are atypical, such as the anterior communicating artery (AcomA), anterior cerebral artery, middle cerebral artery, posterior cerebral artery, and basilar artery.^[12,14]

Blister-like aneurysms are treated with both microsurgery and endovascular surgery, while there is no optimal therapeutic strategy. In recent years, endovascular treatment is

becoming the main approach of treatment for blister-like aneurysms due to the development of techniques and devices for endovascular treatment.^[11] It was reported that endovascular treatment has lower morbidity and mortality and achieved better outcomes compared with surgery for blister-like aneurysms.^[12] Several reports of endovascular treatment for such have been reported, including stent-assisted coiling and flow diversion.

Blister-like aneurysms of the Acoma are very rare with only ten previously reported cases [Table 1].^[1,2,10,13,15,16] Two cases among them underwent endovascular treatment with flow diverter (FD),^[13,15] while there was no report treated with stent device only. We report the first case of a blister-like aneurysm of the Acoma that was treated solely with the Low-profile Visualized Intraluminal Support Junior (LVIS Jr.) stent that achieved complete occlusion without complication.

CASE REPORT

A 50-year-old woman was admitted to our hospital due to a sudden headache. Computed tomography demonstrated diffuse subarachnoid hemorrhage with no laterality [Figure 1a]. The World Federation of Neurosurgical Society grade was grade III. Cerebral digital subtraction angiography (DSA) revealed a very small aneurysm in the dorsal side of the Acoma [Figure 1a and b]. We considered it a blister-like aneurysm based its size and shape. There was a high risk for intraoperative rupture because the aneurysm due to its small size and irregular shape for both coil embolization and the direct approach. Therefore, we planned treatment after vasospasm period solely with neck bridging stent expecting flow diversion effect. Diameter of the left A2 was 2 mm and the right A1 was dominant. Based on the DSA findings, we decided to place LVIS Jr. stent (Terumo, Tokyo, Japan) from the left A2 to the right A1 covering Acoma. DSA at day 8 showed that the size of the aneurysm remained unchanged.

Endovascular treatment was performed under general anesthesia at day 15. Dual antiplatelet therapy was administered a week prior. A 6Fr Roadmaster (Goodman, Aichi, Japan) was placed in the right internal carotid artery with the administration of the systemic heparin. Headway 17 (Terumo, Tokyo, Japan) was delivered to the left A2, and 2.5 × 17 mm LVIS Jr. stent was implanted from the left A2 to the right A1 covering Acoma. The LVIS Jr. stent was deployed with wire pushing in order to avoid insufficient expansion. Sufficient expansion and patency of the stent were confirmed [Figure 2a].

The postoperative course was uneventful and she was discharged with no neurological deficit at day 39 (postoperative day 24). DSA at postoperative day 14 showed that the aneurysm remained unchanged; however, complete occlusion was achieved 3 months after the treatment [Figure 2b].

DISCUSSION

Endovascular treatments for blister-like aneurysms include stent-assisted coiling, stenting alone, and flow diversion.^[11] There have been 27 reported cases of ruptured blister-like aneurysms treated with stenting alone, which includes 11 cases treated with a single stent, and 16 cases with multiple stents.^[3-6,8,18] All of them except one case were treated at the acute phase of subarachnoid hemorrhage. The aneurysms enlarged postoperatively in four cases (14%), with two of them requiring additional stent placement and the remaining two cases undergoing parent artery occlusion.^[5,18] Twenty- three cases (85%) achieved complete occlusion with good outcome, and the median period of confirmation of occlusion after treatment was 6 months (day 4–54 months). There was no treatment-related complication. In the present case, complete occlusion was achieved with good outcome, and there was no treatment-

Table 1: Literature review of blister- like aneurysms of the anterior communicating artery.

Case	Age/sex	SAH grade	Diagnosis	Treatment	Timing of treatment (days)	Complication (treatment associated)	Outcome at discharge (mRS)
Andaluz and Zuccarello ^[2]	41M	HH 3	DSA	Clipping	NM	Intraoperative rupture	3
	18F	HH 2	CTA	Clipping	NM	None	2
	51F	HH 1	CTA	Clipping	NM	None	0
	59F	HH 4	DSA	Clipping	NM	Intraoperative rupture	3
	54F	HH 3	CTA	Clipping	NM	None	4
Morris and Brophy ^[10]	52M	NM	DSA	Clipping	12	None	0
Seo et al. ^[16]	63M	HK 3	CTA	Clipping	0	None	3
Rouchaud et al. ^[15]	61M	WFNS 1	DSA	FD	1	None	0
Peschillo et al. ^[14]	70F	WFNS 3	DSA	FD	1	None	0
Abiko et al. ^[1]	60F	WFNS 4	DSA	Coating	17	None	1
Present case	50F	WFNS 3	DSA	Stenting	15	None	0

HH: Hunt and Hess grade, HK: Hunt and Kosnik grade, WFNS: World Federation of Neurosurgical Society grade, DSA: digital subtraction angiography, CTA: computed tomographic angiography, FD: flow diverter, mRS:modified ranking scale, NM: not mentioned

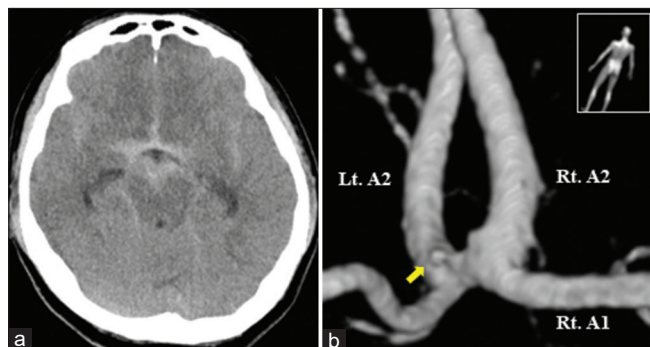


Figure 1: Computed tomography upon admission showing subarachnoid hemorrhage (a). Posterior-anterior view of preoperative 3D rotation angiography (3D- RA) demonstrating a small and irregular shaped aneurysm of the dorsal anterior communicating artery with a diameter of 1.5 mm (b; arrow).

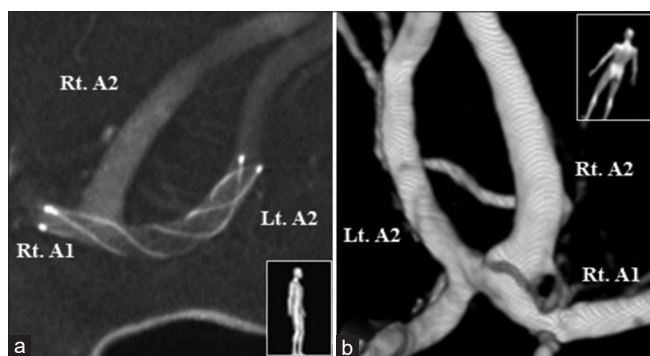


Figure 2: Postoperative cone beam computed tomography showing the implanted Low-proliferation Visualized Intraluminal Support Junior stent from the left A2 to the right A1 covering the anterior communicating artery (a). 3D- RA at 3 months after the treatment demonstrating complete occlusion of the aneurysm (b).

related complication. From the above, treatment of blister-like aneurysms with stent alone is an acceptable strategy because of the high rate of complete occlusion and good clinical outcome.

Metal coverage ratio of the stent is the most important factor in terms of the flow diversion effect. The approximate metal coverage ratio of the FD is 30%, while that of LVIS, LVIS Jr., Enterprise (Johnson and Johnson Codman, Miami, FL, USA), and Neuroform Atlas (Stryker, Fremont, CA, USA) is 23%, 18%, 11%, 12%, respectively.^[9,19] It was reported that the metal coverage ratio of overlapped dual LVIS was 33%.^[7] Among the FDs approved in Japan, FRED (Terumo, Tokyo, Japan) is suitable for the proximal anterior cerebral artery; however, it was off-label in the present case because the diameter of the left A2 was 2 mm and this case was an acute phase subarachnoid hemorrhage. We selected single LVIS Jr. stent for the initial treatment, and we intended to add one more stent if the aneurysm became enlarged after the initial treatment. Among blister-like aneurysms treated with

stent only, aneurysms of the middle cerebral artery and the posterior cerebral artery treated with single stent achieved complete occlusion without additional treatment.^[3,6] From the above, treatment with single stent for blister-like aneurysms that occur elsewhere than the internal carotid artery could achieve complete occlusion without additional treatment.

Another treatment option for blister-like aneurysms is direct surgery such as clipping and trapping. In Acoma aneurysms, the most critical concern is the preservation of the hypothalamic artery. Seven cases of Acoma blister-like aneurysm were treated by clipping and intraoperative rupture occurred in two cases among them [Table 1].^[2,10,16] It was noted that one or more straight and fenestrated clips were applied in the manner of remodeling the Acoma, however, there was no description about the hypothalamic artery during surgery.^[2] In the present case, we considered that clipping was dangerous because the aneurysm projected into the dorsal side of Acoma, increasing the rate of intraoperative rupture. It was reported that surgical treatment for blister-like aneurysms could achieve immediate and high rate of obliteration, while endovascular treatment was safer and could lead to a better outcome than direct surgery.^[17] The disadvantage of the treatment with stent only for blister-like aneurysms is the necessity of waiting for complete occlusion in several periods. Postoperative regrowth of blister-like aneurysms treated with stent only occurred within 1 month after initial treatment.^[5,18] In other words, we could expect complete occlusion if the regrowth of aneurysm does not occur within 1 month after treatment. Early and careful follow-up is necessary in the case of blister-like aneurysms treated with monotherapy with stent.

CONCLUSION

This is the first report of a ruptured blister-like aneurysm of the Acoma treated solely with a stent. Monotherapy with stent for blister-like aneurysms might be an effective treatment with lower rate of complications than direct surgery. Complete occlusion could be expected for blister-like aneurysms with single stent occurring elsewhere than the internal carotid artery. We should consider immediate additional treatment if the aneurysms grow within 1 month after initial treatment.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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