Stenting Procedure for Sinus Stenosis with Transverse-Sigmoid Dural Arteriovenous Fistulas

A Case Report

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Summary

We reported the dural AVF case with sinus stenosis, that was entirely treated through the stenting procedure. 61-year-old male had been realizing the attack which causes bilateral visual problem. He would have suffered from the intracranial hypertension caused by dural AVF in the right transverse sinus and left transverse sinus stenosis. We performed TVE and sinus stenting, then used the antiplatelet and the anticoagulant. However, six months later, he suffered from SAH due to recurrence of dural AVF. We performed TVE again, denser packing than usual. Two years later, he have no symptom, angiographically, there was no recurrence of dural AVF and patency of stented sinus.

We think denser embolizations should have performed in case of dural AVF with sinus stenting.

Introduction

As regards the stenting procedure for sinus stenosis there are only a few reports in publication¹⁻⁴, besides both long-term patency and complication seem to be unclear.

We reported the dural AVF case with sinus stenosis that was entirely treated through the stenting procedure, though it had SAH caused by recurrence of dural AVF during the follow-up period.

Case Presentation

61-year-old male had been realizing the attack which causes bilateral visual problem. When he visited a hospital, it is pointed out that he suffered from the dural AVF in the transverse sinus and the intracranial hypertension, thus he was transferred to our hospital for the advanced treatment.

The right external carotid angiogram shows the occlusion of right sigmoid sinus and the left transverse sinus stenosis, resulting in the reflux to the contralateral transverse sinus and SSS (figure 1A,B).

Dural AVF elicits the impairment of the normal venous circulation. The flow in the straight sinus is antegrade, albeit a little weak, and runs into the left transverse sinus via the confluence (figure 1C,D).

First of all TVE performed through the contralateral transverse sinus yielded the disappearance of the flow to the dural AVF from the right EC. This procedure caused any amelioration other than the ICP reduction from 41 cm H₂O to 29 cm H₂O.

Angiography followed after the TVE still revealed the flow to the confluence from left EC and the mild proceeding of the left transverse sinus stenosis (figure 2A). Then, both TAE through the left EC and PTA/stenting procedure to the left transverse sinus stenosis were planned.

Figure 1 A,B) The right external carotid angiogram shows the occlusion of right sigmoid sinus and the left transverse sinus stenosis, resulting in the reflux to the contralateral transverse sinus and SSS. C,D) Dural AVF elicits the impairment of the normal venous circulation, resulting in the impairment of SSS demonstration and the delay of the circulation time. The flow in the straight sinus is antegrade, albeit a little weak, and runs into the left transverse sinus via the confluence.

Stenting Procedure

At first, we performed PTA with 5 x 13 mm balloon. But stenotic sinus easily collapsed. So we performed sinus stenting with BX stent 5 x 18 mm, and post-dilated with 6mm balloon (figure 2B,C). Then we performed TAE through the left EC. Postoperative angiography showed no dural AVF (figure 2D,E).

Post-operative Course

After the sinus stenting, we use antiplatelet and the anticoagulant. ICP was lowered all the way to 21 cm H₂O as well as the reduction in the enlargement of Marriott blind spot and the improvement of the visual disturbance. However, six months later he had severe headache and was transferred to our hospital. CT scan

Figure 2 A) Angiography followed after the TVE still revealed the flow to the confluence from left EC and the mild proceeding of the left transverse sinus stenosis. B,C) Angiography shows sinus patency with BX stent 5 x 18 mm, and post-dilated with 6 mm balloon. D,E) Postoperative angiography shows no dural AVF on bilateral ECAG.

shows the SAH mainly in the interhemispheric cistern (figure 3). Bilateral ECAG shows the brand-new A-V shunts from STA and MMA with the cortical reflux (figure 4A,B; arrow).

Right OA angiography revealed the dural AVF in the right transverse sinus with cortical reflux (figure 4D: arrow), which appeared to be extinct after the first treatment (figure 4C: arrow).

Second TVE

Microcatheter was easily inserted into the coils which was put on the last time and the coiling was started from the center of old coils with the use of mainly GDC10 coils. Denser sinus packing was performed than usual, besides the TAE was performed following the TVE.

Figure 3 CT scan shows the SAH mainly in the interhemispheric cistern.

After all the procedures the dural AVF and AV shunt disappeared angiographically. Post-operative ICAG shows the improvement of the venous circulation time and brand-new antero-graduate venous circulation in the right transverse sigmoid sinus. Then we did not use antiplatelet and the anticoagulant.

In the angiography performed two years af-

ter the treatment there isn't any finding of the dural AVF and AV shunt (figure 5A,B). Antero-graduate flow in the right transverse-sigmoid sinus appears to be developed (figure 5C: arrow) and the patency in the region of stenting in the left transverse sinus is preserved without medication (figure 5D: arrow).

Angiographical circulation time and Marriot

Figure 4 A,B) Bilateral ECAG shows the brand-new A-V shunt from STA and MMA with the cortical reflux (arrow). C,D) Right OA angiography revealed the dural AVF in the right transverse sinus with cortical reflux, which appeared to be extinct after the first treatment (arrow).

blind spot are normalized and visual disturbance was cured.

Discussion

Table 1 shows sinus stenting for the treatment of venous hypertension. All cases used the antiplatelet or the anticoagulant after stent-

ing. Since in our case the occlusion of the stent would turn out to be a lethal outcome, we used the antiplatelet and the anticoagulant, Aspirin 200mg/day and Warfarin 1-2 mg/day. INR controlled under 2.5.

There is a possibility that the antiplatelet and the anticoagulant prescribed after the TVE might have inhibited the thrombus formation

Figure 5 A,B) Bilateral ECAG shows no dural AVF and AV shunt. C) Right ICAG shows anterograde flow in the right transverse-sigmoid sinus (arrow). D) Left ICAG shows the patency in the region of stenting in the left transverse sinus (arrow).

and organization, eventually assisted the recurrence of the dural AVF.

We think the antiplatelet and the anticoagulant treatment should have not been commenced until the thrombus formation and the organization after the TVE are completed. If necessary, denser embolizations should have performed than usual, in case of dural AVF with sinus stenting.

Another question is, after the certain period, the antiplatelet and the anticoagulant treatment would not be required?

In our case, we use antiplatelet and the anticoagulant treatment to eight months after sinus stenting, but do not use after haemorrhagic complication. The patency in the region of stenting is preserved without medication for two

Table 1 Sinus stenting for the treatment of venous hypertension.

Author	age sex	DAVF	stented sinus	PTA	stent	medication	Patency of stented sinus	clinical symptom
Marks (1994)	25F 8M	(-) (-)	transverse sigmoid	collapse collapse	Wallstent Wallstent	warfarin warfarin	(+) (+)	cure (4 mos) no change (4 mos)
Malek (1999)	13F	(+)	occipital	reocclusion (3 days)	Wallstent	warfarin aspirin ticlopidine	(+)	cure (1 year)
Murphy 2000	52M	(+)	transverse & sigmoid	reocclusion (5 days)	Multi-Link	Coumadin	(+)	cure (4 mos)
Higgins (2002)	30F	(-)	transverse	(-)	Wallstent	warfarin → aspirin	(+)	improved (1 year)
our case 2002	61M	(+)	transverse	collapse	BXstent	warfarin & aspirin → SAH no medication	(+)	cure (2 year)
Abbreviations: DAVF; dural arterio-venous fistulae, PTA; percutaneous transluminal angioplasty								

years. Further studies are warranted to clarify this question.

Conclusions

We reported the dural AVF case with sinus stenosis that was entirely treated through the stenting procedure, though it had SAH caused

by recurrence of dural AVF during the follow-up period. We think denser embolizations should have performed than usual, in case of dural AVF with sinus stenting, cause the antiplatelet and the anticoagulant prescribed after the TVE might have inhibited the thrombus formation and organization, eventually assisted the recurrence of the dural AVF.

References

- 1 Higgins JN, Owler BK et Al: Venous sinus stenting for refractory benign intracranial hypertension. *Lancet* 359: 228-230, 2002.
- 2 Marks MP, Dake MD et Al: Stent placement for arterial and venous cerebrovascular disease: preliminary experience. *Radiology* 191: 441-446, 1994.
- 3 Malek AM, Higashida RT et Al: Endovascular recanalization with balloon angioplasty and stenting of an occluded occipital sinus for treatment of intracranial venous hypertension: technical case report. *Neurosurgery* 44: 896-901, 1999.
- 4 Murphy KJ, Gailloud P et Al: Endovascular treatment of a grade IV transverse sinus dural arteriovenous fistula by sinus recanalization, angioplasty, and stent placement: technical case report. *Neurosurgery* 191: 497-500, 2000.

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