

# Prognostic Implication of Residual Shunt after Initial Endovascular Treatment of Cavernous Sinus Dural AVF

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#### Introduction

The clinical implication of residual shunt seen immediately after endovascular treatment (EVT) of cavernous sinus arteriovenous fistula (CS-dAVF) is not well known.

### **Methods**

We retrospectively reviewed clinical course and changes in neuroimaging finding of 17 patients with residual shunt out of 50 patients who underwent EVT for CS-dAVF.

#### Results

No major retrograde shunt flow nor cortical reflux was seen in these 17 patients. Shunt flow was seen mainly in the inferior petrosal vein (IPS) in 8 patients and in both superior ophthalmic veins (SOVs) and the IPS in 9 patients (Figure 1). Among the 17, 3 underwent a second tVE procedure; it obliterated shunt flow. Stereotactic radio-surgery using a gammaknife unit was performed in 4 patients. The other 10 underwent no additional procedures.

The shunts eventually disappeared in all 17 patients at 1 - 42 months after the initial ETV (median 4-, mean  $12.7 \pm 13.3$  months) (**Figure 2**). Shunt related symptoms completely disappeared in 14 (82.3%) out of the 17 patients at the latest follow-up. No aggravation of symptoms was seen in the other 3 patients.

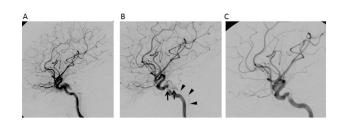
# **Learning Objectives**

The clinical implication of residual shunt flow after endovascular treatment of CS-

## **Conclusions**

Considering the well manageable nature of minor residual shunt flow after the EVT, the tight packing of cavernous sinus aiming complete disappearance of shunt flow should be avoided; which may result in the aggravation of the cavernous sinus symptoms.

Figure 1



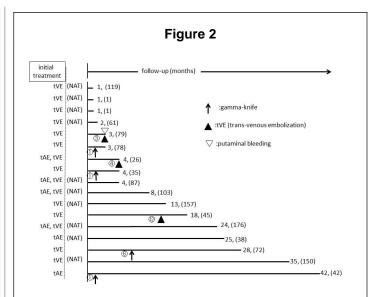
A 64-year-old woman with a 4-month history of left chemosis, orbital pain, and double vision.

A:Pre-treatment DSA of the left ICA showing shunt flow in the left SOV and inferior petrosal vein.

B:Post-treatment DSA showing coils placed in the left cavernous sinus (arrows). Minor shunt flow into the inferior petrosal vein persisted (arrow heads).

C: DSA performed one month later disclosed spontaneous disappearance of the shunt flow without additional

treatment.



Follow-up of 17 patients whose shunt flow remained immediately after initial endovascular treatment. tVE: trans-venous embolization, tAE: trans-arterial embolization, NAT: no additional treatmentEncircled numerals indicate the interval from initial to additional treatment. Uncircled numerals indicate the interval from initial treatment to the timing of neuroimaging studies confirming shunt disappearance. Numerals in parentheses indicate the duration of total follow-up after the initial treatment.: timing of gamma-knife treatment.: timing of tVE,: time of putaminal bleeding