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# Intracerebral Venous Hemorrhage after Cerebral Aneurysmal Surgery

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**Abstract** Four cases of venous hemorrahage following aneurysmal surgery were presented for evaluate the veous circulation. These four cases had frontal irregular patchy hemorrhages with massive low density area demonstrated by CT scan. We surmise that these are hemorrhagic infarctions caused by the disturbance of venous drainage. In case 1 and case 2, the sacrificed connecting veins in the sylvian fissure were suspected to be the cause of the hemorrhagic infarction because of a poorly developed frontal ascending vein. In case 3, both a transsylvian and interhemispheric approach caused venous congestion. In case 4, the head of the clip had influenced the venous return of the sylvian vein. The number of veins and their branches to be sacrificed should be kept to a minimum because the resulting neurological deficits may not be transient. On the other hand, veous phase angiogram may also be helpful in anticipating any alteration in the direction of venous flow when sacrifice of a vein is unavoidable.

*Key words* : Cerebral aneurysm, Postoperative, Hemorrhage, Venous congestion

## Introdunction

It has occasioinally been reported that surgical sacrifice of cerebral veins may lead to venous infarction, hemorrhage, swelling and neurological deficit. On the ther hand, obliteration of bridging veins is inescapable in some operative approaches. The number of these veins and their branches to be sacrificed should be kept to a minimum because the resulting neurological deficits, although infrequent and usually transient, may be permanent. We present four cases of venous hemorrhage following aneurysmal surgery and stress the management at the time of venous sacrifice.

## Case 1

A 58-year-old male complained of acute onset of headache and was admitted to our hospital on May 30, 1989. The patient was on the alert with neck stiffness and a positive Kernig sign. CT -scan showed subarachnoid hemorrhage and cerebral angiogram demonstrated an anterior communicating artery aneurysm on the arterial phase and a normal sylvian vein with a poor ascending frontal vein on the venous phase (Fig. 1). One week after onset, right frontotemporal craniotomy and clipping of the aneurysm were performed using the transsylvian approach. During resection of the sylvian fissure, two small veins draining into the sylvian vein were sacrificed in the frontal lobe. After the operation, the patient's consciousness did not fully recover.

CT scan (Fig.2) showed right frontal swelling with an irregular hemorrhage. Moreover, patient's consciousness deteriorated progressively to semicoma and diffuse hemorrhagic infarction was demonstrated by CT scan. Emergency decompressive craniotomy was performed 2days after the initial operation. After the operation, the patient gradually recovered with residual aphasia. He was transferred to an other hospital for rehabiliation of the aphasia on June 25.

Fig.1 : Venous phase angiogram in case 1 shows a normal sylvian vein with a poor ascending frontal vein.

### Case 2

A 53-year-old male was admitted our hospital with severe headache and nausea. Cerebral angiogram showed a right middle cerebral artery (MCA) aneurysm. Emergency surgery for clipping of the cerebral aneurysm was performed using the transsylvian approach on June 3, 1988. a moderate sized draining vein from the frontal to the temporal lobe was sacrificed during the operation. The patient complained of severe headache for several days postoperatively and CT scan demonstrated a right intracerebral hematoma to be caused by venous congestion. The patient was treated with conservative therapy and was discharged in good condition 32 days after the operation.

### Case 3

A 54-year-old female had sudden onset of headache, vomiting and disturbance on consciousness. On admission, neurological findings included a right hemiparesis and drowsiness. Cerebral angiogram showed bilateral MCA and right distal ACA aneurysms. Using a transsylvian approach, the ruptured left MCA aneurysm was clipped on June 27, 1986 and the right MCA aneurysm on August 19. The distal ACA aneurysm was also clipped on August 19 using the interhemispheric approach. The patient's

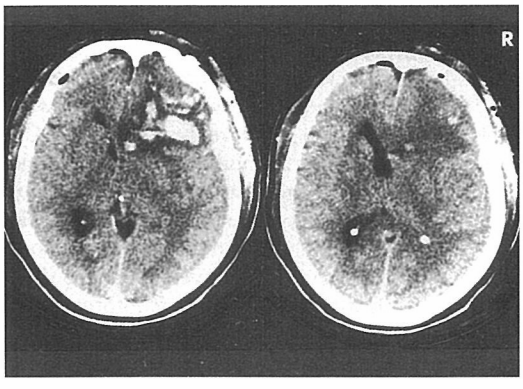


Fig.2 : CT scan in case 1 shows right frontal swelling with irregular intracerebral hemorrhage.

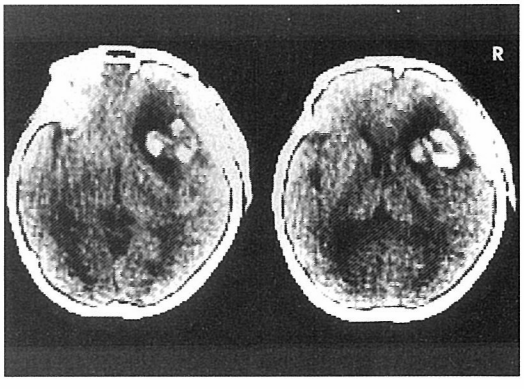


Fig.3 : CT scan in case 3 shows a right frontal irregular patchy hemorrhage caused by venous congestion.

level of consciousness did not fully recover after the operation. Repeated CT scan (Fig.3) showed a right frontal irregular patchy hemorrhage. Level of conscioiusness gradually improved following emergency decompressive craniotomy 2 days after the initial operation.

### Case 4

A 65-year-old female complained of right ptosis. A right MCA aneurysm was demonstrated by cerebral angiography. On August 8, 1986 the aneurysm was clipped using the transsylvian approach. Three draining veins from the frontal to the temporal lobe were sacrificed within the sylvian fissure. There were no neurological deficits postoperatively despite CT scan demonstrating a right frontal irregular hemorrhage with mass effect (Fig.4). Postoperative angiogram revealed a stenotic superficial sylvian vein kinked by the head of the clip (Fig.5).

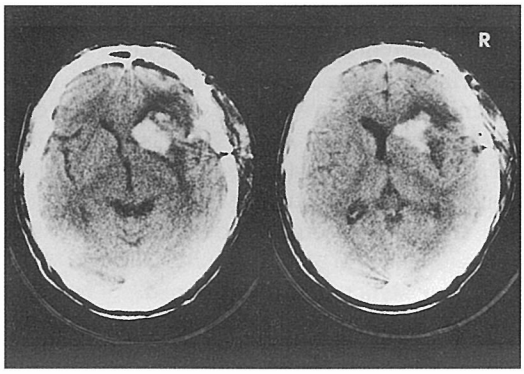


Fig.4 : CT scan in case 4 demonstrates a right frontal irregular patchy hemorrhage with mass effect.

Fig.5 : Postoperative angiogram in case 4 revealed a stenotic superficial sylvian vein kinked by the head of the clip.

### Discussion

The majority of aneurysmal surgery is now performed in the acute stage. Therefore, the fragility of the brain must be kept in mind. There are abundant venous anastomoses in the brain[1,2]. However, it has been reported that sacrifice of the veins infrequently led to venous infarction, hemorrhage, swelling and neurological deficits[3], especially during the acute stage. These four cases in this report had frontal irregular patchy hemorrhages with massive low density areas demonstrated by CT scan. We surmise that these are hemorrhagic infarctions to be caused by the disturbance of venous drainage. In case 1 and case 2, the sacrificed connecting veins in the sylvian fissure were suspected to be the cause of the frontal hemorrhagic infarction because of a poorly developed frontal ascending vein. In case 3, the small sacrificed veins worsened the venous drainage after using both a transsylvian and interhemispheric approach, causing venous congestion. In case 4, postoperative angiogram demonstrated that the head of the clip had influenced the venous return of the sylvian vein. Generally, venous drainage is influenced by many factors. Anesthetic drugs, $CO_2$, blood pressure and water balance have been reported. During surgery, optimal positioning of the patient, control of intracranial pressure by ventricular or cisternal drainage, and minimal brain retraction should be applied in order to preserve venous return. Obliteration of the veins is inescapable in some operative approaches. However, the number of these veins and their branches to sacrificed should be kept to a minimum because the resulting neurological deficits may not be transient. On the other hand, the examination of a venous phase angiogram may also be helpful in anticipating any alteration in the

direction of veous flow when sacrifice of a vein is unavoidable. We must keep in mind the risks of venous occlusion and surgical techniques[4] for preserving the draining veins during acute stage surgery. Sasaki[5] reported cases of reconstructed cerebral cortical veins with silicone tubing after transection of the vessels for removal of parasagittal tumors. Cerebral angiography showed that the reconstructed vein remained. The techniques for reconstructing and bypassing a major venous system[6] might be occasionally required in vascular lesions, as in aneurysms.

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