Reconstruction of cerebral cortical veins using silicone tubing

Technical note

TOSHIKUKE SAKAKI, M.D., TETSUYA MORIMOTO, M.D., KIYOSHI TAKEMURA, M.D., SELII MIYAMOTO, M.D., KIKUO KYOI, M.D., AND SHOZABURO UTSUMI, M.D.

Division of Neurosurgery, Nara Medical University, Kashihara, Nara, Japan

A technique for reconstruction of a cerebral cortical vein which has been sacrificed during an interhemispheric or subtemporal surgical approach is described. The method involves the use of silicone tubing. The author's clinical experience in six patients is summarized.

KEY WORDS • cerebral vein reconstruction • silicone tube • revascularization

A CUTE obstruction of a cortical vein may cause venous congestion, edema, and even intracerebral hemorrhage in the territory affected. With an interhemispheric or a subtemporal surgical approach, cerebral cortical bridging veins are occasionally sacrificed, causing cerebral damage and neurological deterioration. The present paper describes a microsurgical revascularization procedure bridging the proximal and distal sides of the sacrificed vein with a thin-walled silicone tube.

Operative Technique

When an interhemispheric or subtemporal approach to a lesion requires that a bridging cortical vein be sacrificed, the cortical vein is exposed from the sinus portion to 1 cm distal to the site of division. The vein is then clipped and divided. Both ends of the vein are protected with wet cotton. At the close of surgery both ends of the vein are again exposed. If the ends have separated, saline solution can be infused into the subarachnoid space to decrease the distance between the ends. A silicone tube that is most suitable to the size of the vein orifice is selected and inserted into the distal segment of the vein and fixed with a 10-0 monofilament nylon circumferential tie. The other end of the silicone tube is then inserted into the proximal end of the vein and tied. Following the removal of the vascular clips, the return of venous flow from the distal side to the proximal side of the cerebral cortical vein is observed (Fig. 1).

Clinical Experience

Reconstruction of a cerebral cortical vein by means of silicone tubing was performed in six patients (Table 1). Two patients had parasagittal meningiomas, one had a falx meningioma, and one had a tentorial meningioma. Two patients were operated on for anterior cerebral artery aneurysms. Postoperative angiography showed good venous flow in the reconstructed cortical vein in five patients who showed no symptoms related to venous congestion (Figs. 2 and 3). In one patient...
with a parasagittal meningioma the reconstructed vein was not visualized on angiograms obtained on the 9th postoperative day; however, this patient had no new neurological deficit postoperatively.

**Discussion**

Acute obstruction of a cerebral cortical vein may cause venous congestion of the relevant territory, leading to cerebral focal edema or, occasionally, petechial hemorrhages. Occlusion of a large cortical vein such as the rolandic vein or the vein of Labbé can result in severe neurological deficit. Kawase, et al.,\textsuperscript{3} reported four cases of acute cerebral venous thrombosis that showed a high-density focus simulating subcortical arterial hemorrhage on computerized tomography scanning. Cambria\textsuperscript{2} reported hemorrhagic cerebral infarction after the thrombosis of the vein of Labbé. Benoist and Pásztor\textsuperscript{1} analyzed 117 operated cases of parasagittal meningioma from the point of view of venous disturbances and noted that of 13 patients whose cortical veins were occluded during surgery, eight had postoperative edema. Besides these cases of venous thrombosis or tumor invasion of the veins, cortical veins may be sacrificed during an interhemispheric or subtemporal surgical approach. Reconstruction of the cerebral cortical vein with silicone tubing protects the brain from venous congestion and secondary edema or petechial hemorrhage. The long-term patency of venous flow with this technique has not been tested, but there was

<table>
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<th>Case No.</th>
<th>Site of Lesion</th>
<th>Approach</th>
<th>Postop Angiography</th>
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<tbody>
<tr>
<td>1</td>
<td>parasagittal meningioma</td>
<td>interhemispheric</td>
<td>patent: good flow</td>
</tr>
<tr>
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<td>interhemispheric</td>
<td>patent: fair flow</td>
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<tr>
<td>3</td>
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<td>interhemispheric</td>
<td>patent: fair flow</td>
</tr>
<tr>
<td>4</td>
<td>tentorial meningioma</td>
<td>subtemporal</td>
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<tr>
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<td>interhemispheric</td>
<td>patent: good flow</td>
</tr>
<tr>
<td>6</td>
<td>ACA aneurysm</td>
<td>interhemispheric</td>
<td>patent: fair flow</td>
</tr>
</tbody>
</table>

*ACA = anterior cerebral artery.*

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**TABLE 1**

*Summary of six cases with reconstruction of cerebral cortical veins*

**FIG. 2.** Case 1. *Left:* Preoperative angiogram, lateral view, showing a large rolandic vein completely invaded by a parasagittal meningioma (arrowheads) near the superior sagittal sinus. *Right:* Postoperative angiogram, lateral view, after removal of the tumor with the invaded segment of the rolandic vein and reconstruction of the vein with silicone tubing. The rolandic vein is well visualized (arrows).

**FIG. 3.** Case 2. Postoperative angiogram, anteroposterior view, after surgery for excision of an anterior cerebral artery aneurysm. Return of flow in the reconstructed pre-rolandic vein (small arrows) was visualized. The reconstructed portion with the silicone tubing (large arrow) is narrower than the rest of the vein.
Cerebral cortical vein reconstruction

venous flow on angiography performed 7 to 15 days after surgery in five of the six patients whose cortical veins were reconstructed. No patient had any postoperative symptoms considered to be caused by acute venous congestion. This technique for reconstruction of a cortical vein with silicone tubing is very simple and can avert acute obstruction of a cortical vein following surgery.

References


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Address reprint requests to: Toshisuke Sakaki, M.D., Department of Neurosurgery, Nara Medical University, Kashihara, Nara, Japan.