Preservation of large bridging veins during brain retraction

Technical note

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The authors describe a method for preserving large bridging veins during neurosurgical procedures by stripping them from the cortex. This technique was used in 81 procedures involving a subtemporal, interhemispheric, infratentorial supracerebellar, and transsylvian approach. Although a small amount of the cortex was often sacrificed, preservation of the vein was easy, and postoperative morbidity was minimized.

KEY WORDS cerebral vein • brain retraction • neurosurgical technique

In the approach to deep-seated lesions, big draining veins bridging the cortex and sinuses may have to be sacrificed, with postoperative complications in many cases. It is clear that preservation of a big vein can improve operative morbidity, especially in those cases where excessive brain retraction is required in combination with preexisting brain edema, or where the vein happens to be draining an arteriovenous malformation (AVM). We report a simple technique which we have used for the preservation of a large bridging vein; some neurosurgeons may already be using it.

Since 1979, we have been able to preserve in 81 cases such important veins as the Rolandic and other cortical veins in the interhemispheric approach, Labbé's vein in the subtemporal approach, the Sylvian vein in the anterior temporal approach, and the inferior vermian veins in the infratentorial supracerebellar approach, by the following method.

Technique

After an ordinary craniotomy and dural opening, and before starting brain retraction, the arachnoid and the cortex around a big bridging vein were dissected free for a length of 10 to 20 mm distally (to the brain side) from the cortical edge (Fig. 1). The length of stripped vein depended upon the width of brain retraction necessary for the subsequent procedure. Enough subarachnoid space was found around the big vein close to the dura, and the portion of the vein close to the sinus could easily be stripped merely by dissecting the arachnoid. However, the distal portion of the vein remained tightly adherent to the arachnoid. Therefore, it was safer to avoid injury to the vein wall by sucking the smallest possible portion of the cortex, if the cortex was not a critical area such as a motor strip, and small tributaries of the vein were occasionally sacrificed if necessary. Retraction of the brain slightly distant from the vein then made visualization of the deep-seated lesions possible without sacrificing the vein.

When additional brain retraction was necessary during the procedure, the vein was further stripped off according to the degree of tension in the stretched vein. When retracting the brain, every effort should be made to preserve the vein by setting the retractor obliquely or more distant from the vein. For additional protection of the stripped vein during operation, it should be covered with Oxycel and occasionally a cotton patty to prevent it from getting dry and injured. We emphasize that the vein wall is especially weak at its entrance into the dural sinus.

Results

In the past 3 years, we have been able to preserve Labbé's vein in the subtemporal approach in 28 cases.
Preservation of bridging veins

FIG. 1. Schematic drawing showing preservation of a large bridging vein. Left: Preparation for vein stripping. The removed portion of the cortex is purposely drawn larger than actual size. Right: The brain is retracted after vein stripping.

of tentorial meningioma, trigeminal neurinoma, glioma, AVM, and aneurysm of the posterior cerebral artery; the Rolandic and other big veins in the interhemispheric approach in 16 cases of falx meningioma, craniopharyngioma, glioma, AVM, and aneurysm; the Sylvian vein in 28 cases of basilar artery aneurysm, glioma, and meningioma; and the inferior vermian vein in the infratentorial supracerebellar approach in nine cases of pineal tumor, tentorial meningioma, and AVM. On the other hand, in 24 other cases with similar lesions, big veins were sacrificed because the cortical dissection around the veins was insufficiently wide or brain retraction was too great. Among those cases where veins were sacrificed, the postoperative computerized tomography scan revealed areas of low or high density three times more frequently than in the other cases. Such postoperative findings may be due to a combination of the sacrifice of a major vein in addition to factors such as excessive brain retraction.

Discussion

In this era of microneurosurgery, approach to a deep lesion can be performed through a much smaller operating field with less brain retraction than in the past. Even with the aid of an operating microscope, however, it is sometimes difficult to preserve a big bridging vein in cases with a large deeply seated tumor, AVM, or aneurysm in an unusual location through an interhemispheric, subtemporal, or infratentorial approach. When a big vein is sacrificed, increase of venous pressure can cause additional brain damage during retraction as well as postoperatively. There can be no question that all big veins should preferably be preserved, and the force and duration of brain retraction should be minimized.

Intraoperative preservation of a venous trunk has been emphasized by many authors, but how to preserve it has not been precisely described.1-6 Our method for preservation of a large vein is somewhat similar to that for preservation of the olfactory nerve via the bifrontal approach as reported by Suzuki, et al.,6 in that the nerve is dissected free from the adjacent brain. With our method, even if the retraction is made at a distance from the vein, dissecting it from the adjacent arachnoid for some length would help prevent unnecessary overstretching or injury to it, which may happen when the surgeon is not careful enough in retraction during the subsequent procedure. Obviously, isolation of the vein from the arachnoid without sucking the cortex must first be attempted; however, this is only possible for a limited distance close to the cortical edge, and injury to the vein is likely to result due to its tight adherence to the arachnoid.

References

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Manuscript received April 26, 1982.
Accepted in final form July 28, 1982.
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