Suction decompression of aneurysms

Technical note

EUGENE S. FLAMM, M.D.

Department of Neurosurgery, New York University Medical Center, New York, New York

A technique utilizing suction decompression of large aneurysms to allow safer application of a clip is described. Large aneurysms are punctured with a No. 21 scalp vein needle attached to the operating room suction device. This procedure causes relaxation of the aneurysm itself and allows safer application of the clip. The technique has been used in six cases of giant aneurysms.

KEY WORDS □ cerebral aneurysm □ neurosurgical technique □ aneurysm decompression □ giant aneurysm

In the past 10 years, the combined use of microsurgical techniques and hypotensive anesthesia has led to large reductions in the operative mortality and morbidity of aneurysm surgery. In addition to this, our ability to deal with aneurysms previously believed to be inoperable has increased. Several recent reports have discussed the intraoperative management of giant intracranial aneurysms. The control of blood pressure during surgery allows for a more precise and accurate dissection, with the added safety of reduced risk of intraoperative rupture. Nevertheless, situations do arise in which systemic hypotension alone is insufficient to relax the aneurysm enough to allow adequate clipping. This problem occurs with large aneurysms of 2 cm or greater, in which the neck may be 8 mm or more. The size of the aneurysm and the thickness of the wall of the neck often make it difficult for occlusion of the neck to be accomplished by the application of an aneurysm clip. This report describes a technique that has been used in six large aneurysms to achieve relaxation of the aneurysm so that total occlusion can be accomplished with the application of a clip.

Technique

The aneurysms are approached in a standard pterional microsurgical approach. Hypotension, to a systolic pressure of 70 mm Hg, is achieved with nitroprusside. When the aneurysm neck has been suitably prepared for application of a clip by freeing it of the surrounding arachnoid, a determination is made as to whether a clip would totally occlude the aneurysm without compromising the parent vessel (Fig. 1 left). If the aneurysm remains tense in spite of the hypotension, or if the bulky neck will not adequately fit into the largest available clip, a No. 21 butterfly-type scalp vein needle is prepared by removing the plastic flanges from the sides of the needle. Magnification is reduced from the 16 setting to 6 or 10 on the Zeiss OPMI 1 microscope, equipped with a 300-mm objective and × 20 ocular lens, to increase the size of the field visualized. The needle, with its plastic catheter, is then attached to the operating room suction device. The aneurysm dome is punctured obliquely with the needle, and blood is suctioned through the aneurysm with the needle in place. This produces relaxation and slackening of the wall of the aneurysm, and allows for clip occlusion of the aneurysm with reduced intraneurysmal tension (Fig. 1 center). Total occlusion of the aneurysm can be assessed by occluding the suction and observing if the aneurysm refills. Readjustment of the clip or application of additional clips can be carried out with the needle still in place (Fig. 1 right).

To date, this technique has been used in six cases: three aneurysms of the middle cerebral artery, two of the ophthalmic artery, and one posterior communicat-
ing artery aneurysm. In one case, the middle cerebral artery aneurysm was first clipped and then punctured to determine if it was totally occluded. Bleeding occurred from the puncture site, but it was possible to insert the suction device into the same opening and control the bleeding in this fashion. The aneurysm then became slack, and a clip could easily be realigned to achieve total occlusion.

Discussion

This technique allows for safer aneurysm occlusion, particularly in cases of large aneurysms that would otherwise be difficult to clip. It has the advantage of producing localized hypotension within the aneurysm itself, and avoids the need to produce further systemic hypotension to possibly unsafe levels. French, et al., have described the technique of deliberately rupturing aneurysms of the anterior communicating artery and capturing the aneurysm in the sucker to allow accurate clip placement. This method may produce irreparable tears of the aneurysm at its junction with the parent artery, and may cause bleeding that is difficult to control. The present method has allowed us to avoid the application of temporary clips on the parent vessel which, in the presence of systemic hypotension, may produce significant degrees of ischemia. The slackening of tension within the aneurysm is achieved in a controlled fashion without the loss of visibility. Other techniques have been used, such as temporary occlusion of the internal carotid artery in the neck, or the application of a temporary clip to the supraclinoid carotid, but have had the disadvantage that blood flow to the brain supplied by these vessels in addition to the aneurysm is reduced.

In these six cases, the maximum blood loss through the suction was 100 cc in one case; in the other five cases, the amount of blood aspirated through the aneurysm was less than 50 cc.

The technique has been used in large aneurysms, measuring 2 cm or greater. These aneurysms have fairly thick walls and can safely withstand the trauma of a needle puncture without disruption of the entire aneurysm. While it may be hazardous to apply this technique to smaller aneurysms with thin walls, it has proven to be particularly effective in dealing with these more difficult large aneurysms.

References


Address reprint requests to: Eugene S. Flamm, M.D., Department of Neurosurgery, New York University Medical Center, 550-560 First Avenue, New York, New York 10016.