Thrombosis of Intracranial Aneurysms of the Circle of Willis after Incomplete Obliteration by Clip or Ligature Across the Neck

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D r a k e and Vanderlinden have recently shown that incomplete aneurysm surgery may fail to prevent rebleeding and may also result in dangerous enlargement of the residual portion of the sac, months or even years later. They agree with Hōok and Norlén that early reoperation is necessary in these cases.

Black and German’s experiments have shown that the chances of intraluminal thrombosis increase when the volume of the sac is large and the area of the neck is small. We are reporting three cases of incompletely clipped or ligated aneurysms in which the size of the residual portion of the sac has progressively decreased in association with complete intraluminal thrombosis. We are also reporting a fourth case in which thrombosis is not yet complete.

Case Reports

Case 1. On June 30, 1965, this 55-year-old man received a head injury in an automobile accident. Three days later he complained of headache, poor vision, and vertigo, which lasted for 1 month. On October 1, 1965, he showed signs of having had one and possibly two subarachnoid hemorrhages. Right angiography demonstrated an internal carotid aneurysm near the origin of the posterior communicating artery (Fig. 1 top left). Left carotid and bilateral vertebral angiographies were normal. At the subsequent operation, a clip was placed across the neck of the aneurysm.

The postoperative course was very smooth despite a third nerve palsy. Two weeks after the operation angiography showed that the neck of the aneurysm was partially occluded, but that the aneurysm still filled with contrast medium through a narrow aperture (Fig. 1 top right). At 3½ months after operation angiography revealed partial thrombosis of the sac (bottom left). On January 19, 1967, 15 months after surgery, right carotid angiography showed complete thrombosis of the aneurysm (bottom right).

Case 2. This 38-year-old woman had had the signs and symptoms of a subarachnoid hemorrhage when she was 13 years old, but no exploration was carried out. Ever since then she had suffered from intermittent pulsatile headaches, diplopia, and blurred vision. When finally admitted in May, 1967, the neurological examination was normal, as was a right angiography. Left angiography revealed a large saccular aneurysm of the carotid bifurcation (Fig. 2 top left and right). At operation, under hypothermia, hypotension, perfusion of Mannitol, and drainage of the cerebrospinal fluid by lumbar puncture, a silk ligature was placed across the neck of the aneurysm and flush with the parent vessel; however, it was impossible to tighten it because the neck was broad and the aneurysm under tension. While the carotid artery was occluded for 4 min 30 sec with a Mayfield clip, the neck was ligated without risk of rupture.

Transient postoperative hemiplegia and aphasia disappeared a few days later except for very slight right hemiparesis. Ten days after the operation, angiography showed the persistence of the aneurysm with a narrowed neck, angiospasm of the carotid artery and its branches, and hemispheric edema (Fig. 2 bottom left). On August 9, 1967, 3 months later, angiography showed complete obliteration of the aneurysm and no spasm (Fig. 2 bottom right).

Case 3. This 31-year-old man was admitted to the hospital because of headache, vomiting, and sudden loss of consciousness of short duration. He had severe neck stiffness
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and bloody cerebrospinal fluid. Left angiography was normal but right angiography showed an enormous two-lobed aneurysm of the internal carotid artery bifurcation (Fig. 3 left). At operation on July 11, 1967, under hypothermia and hypotension, a silk ligature was tied across the neck, but it caused serious kinking of the middle cerebral artery which was nearly occluded. The ligature was tightened as strongly as possible without narrowing of the middle cerebral artery, and the aneurysmal fundus was coated with plastic (methyl-methacrylate).

The postoperative left hemiparesis disappeared within a few days. After 2 weeks, routine postoperative angiography showed the aneurysm unchanged (Fig. 3 center). Three days after angiography, the patient suddenly developed a left hemiplegia without headache or loss of consciousness. The diagnosis was thrombosis of the middle cerebral artery. Improvement began after 1 month of reeducation, and continued so that a few months later there were no lateralizing neurological signs. On October 10, 1967, carotid angiography showed no evidence of the aneurysm, but there was a serious degree of angiospasm of the carotid artery and of its