CASE REPORTS AND TECHNICAL NOTES

SUCCESSFUL TREATMENT OF AN ANEURYSM OF THE ANTERIOR COMMunicating ARTERY

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Among the various types of intracranial aneurysms, saccular aneurysms of the anterior communicating artery deserve special consideration. Because of their location at a crucial point of the circle of Willis, rupture is particularly dangerous and treatment is hazardous. A review of the literature reveals that relatively few instances of aneurysms in this location have been successfully treated. By “successful” I mean that not only is good recovery obtained after one or several subarachnoid hemorrhages have occurred but subsequent bleeding is avoided. This can be accomplished with certainty only by the complete isolation of the aneurysm sac from the blood stream. Two procedures assure this goal: one is to occlude with clips or tie the neck of the aneurysm with a silk ligature, and the other is “trapping” of the aneurysm. For aneurysms of the anterior communicating artery, the procedure of “trapping” seems very difficult, as pointed out by Poppen11 among others, because the artery is extremely short. Ligature of the neck of the aneurysm undoubtedly is the ideal method, as Norlén8,9 has recently stressed. His reports indicate that the neck can be clipped in quite a number of cases, disproving previous ideas that this procedure is almost impossible.

In a survey of the pertinent literature, 39 cases of aneurysm of the anterior communicating artery treated by the intracranial approach were found in which detailed description was given of the procedure performed.1-7,10,13 In 4 of the 39 cases the operation was limited to exploration of the lesion or evacuation of an intracerebral hematoma; the aneurysm itself was not treated.8,10 I have not included in the 39 cases 8 patients in whom both anterior cerebral arteries were occluded; 5 of the 8 died and the condition of 2 who recovered remained severely impaired.4,5 These cases were excluded because the extensive procedure unquestionably was performed under unexpected circumstances as a life-saving measure. Thirty-five of the 39 patients were treated by all the known methods but in only 23 cases was a definitive procedure accomplished. Eighteen of these 23 cases were reported by Norlén: in 17 the neck of the aneurysm was ligated with 1 casualty, and in 1 “trapping” was performed, resulting in death. Of the remaining 5 patients, 2 died (2 of these patients had ligatures of the neck of the aneurysm, 2 ligatures of the neck combined with clipping of one anterior cerebral artery and 1 “trapping”1,3,6).

Steelman et al.12 did not report any case of aneurysm of the anterior communicating artery in their series of 42 lesions operated upon intracranially. Poppen11 stated that in not a single case of aneurysm in this location was the neck of the aneurysm suitable for insertion of a clip.

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ANEURYSM OF ANTERIOR COMMUNICATING ARTERY

It has recently been emphasized that a more detailed description must be given in all cases of intracranial aneurysms reported; various factors (location, time of operation, existence of hematoma, and so forth) that may influence the final outcome should be included. For this reason it seems worth while to report a single case of aneurysm of the anterior communicating artery successfully treated by direct intracranial attack. It is our only experience with the intracranial approach for saccular aneurysms.

CASE REPORT

A 34-year-old man was admitted to the hospital on April 18, 1955. He had had short episodes of unconsciousness, presumably convulsions, since the age of 18 years. Three weeks before admission, the patient felt dizzy, fell, and was unconscious for about half an hour.

The episode occurred just after defecation. He had had severe headaches and vomiting for a few days and then had begun to improve. About a week later he was able to get up and walk around, although mild headaches still remained. The day before admission, a similar episode took place. He was unconscious for about 30 minutes; when he regained consciousness he had a severe headache and vomiting occurred.

Examination. The patient appeared to be acutely ill. He was drowsy and complained of constant headaches. The only neurological abnormalities were nuchal rigidity, and a positive Oppenheim's sign on the left. The blood pressure was 120 mm. systolic and 60 mm. diastolic. The pulse rate was 56 and temperature 37.3°C. A lumbar puncture revealed bloody cerebrospinal fluid.

Course. Arteriograms of both carotid arteries were made the following morning while the patient was under Pentothal anesthesia. A small saccular aneurysm arising from the anterior communicating artery was visualized in both the lateral (Fig. 1) and the anteroposterior ex-

Fig. 1. Right carotid arteriogram. The aneurysm is visible arising from the anterior communicating artery.
posures of the right carotid artery. Both anterior cerebral arteries were filled from the right. After injecting the left carotid artery the aneurysm was not visualized in the lateral and anteroposterior views. The patient tolerated the procedure well.

The following morning the headaches grew worse, the pulse rate increased, there was a rise in temperature to 39°C, and subsequently the patient became unconscious for about an hour. His head was turned to the left and there was a conjugate deviation of the gaze to the same side. A lumbar puncture revealed an increase in blood in the cerebrospinal fluid.

The patient recovered slowly but headaches and drowsiness persisted. The nuchal rigidity and the positive Oppenheim’s sign on the left continued to be the outstanding neurological findings.

1st Operation. On April 24, 1955, a right frontal flap was turned down under endotracheal ether anesthesia. The intracranial pressure was reduced by continuous spinal drainage. The bone flap was elevated and the dura mater was opened. The right frontal lobe was retracted along the lesser sphenoidal wing, exposing the optic nerves, the right carotid artery and its branches. A small area of yellowish discoloration was observed in the most posterior portion of the right gyrus rectus on the undersurface of the frontal lobe. We believed that the aneurysm was located there and that the discoloration was caused by previous bleeding. No attempt was made to discover the aneurysmal sac, which was encased in the interhemispheral fissure. Two silver clips were placed on the most medial part of the first portion of the right anterior cerebral artery, just before it enters the interhemispheral fissure.

Course. Recovery was uneventful. The headache disappeared gradually and the nuchal rigidity was gone about a week after the operation. As the general condition of the patient improved, it became apparent that some mental symptoms were present, principally indifference and loss of memory for recent events. These symptoms gradually disappeared.

Fig. 2. Left carotid arteriogram after the first operation. The aneurysm is now visible after injecting this side. It appears even larger than before.
Twenty-four days after the operation when the patient was practically free from symptoms, arteriography was repeated in order to determine the effect of the ligature of the right anterior cerebral artery upon the aneurysm. On the right side, only the anteroposterior view was taken which showed the obliteration of the right anterior cerebral artery about 1 cm. from its origin from the carotid artery. The aneurysm was perfectly visualized, however, in both the lateral (Fig. 2) and the anteroposterior views of the left carotid arteriogram. The sac seemed to have increased in size since the previous arteriograms. Both anterior cerebral arteries (distal to the anterior communicating artery) could be seen in the anteroposterior exposure of the left carotid arteriogram.

It was decided to attempt a more radical procedure when the patient had recovered fully from the first operation.

2nd Operation. On June 7, 1955, under endotracheal ether anesthesia, the old right frontal flap was re-elevated, and again continuous spinal drainage was used to reduce intracranial pressure. The frontal lobe was displaced upward and the right anterior cerebral artery and the silver clips previously inserted on it were identified. Resection of the most posterior portion of the right gyrus rectus was sufficient to uncover the aneurysm, which appeared as a spherical mass about 1 cm. in diameter, surrounded by dense fibrous tissue. It was located between the frontal lobes in front of the right anterior cerebral artery. Freeing the sac of the aneurysm, the right anterior cerebral artery and the right side of the anterior communicating artery was a time-consuming procedure. The juncture of the aneurysm and the anterior communicating artery was obscured by the right anterior cerebral artery and could not be adequately exposed. We decided to section this artery between clips immediately distal to the anterior communicating artery, thus exposing the origin of the aneurysm from the anterior communicating artery. There was only a slight narrowing between the aneurysm and the artery, across which a silver clip was placed. The aneurysm and adjacent arteries were wrapped with hammered muscle.

While isolating the aneurysm, hypotension was maintained with the use of Pendiomid. The blood pressure was high during the first part of the operation but did not fall below 100 mm. systolic during the remainder of the procedure.

Course. The patient made a rapid recovery and was out of bed 8 days after the operation. There were no obvious mental or neurological symptoms except for the persistent positive Oppenheim's sign on the left.

Left carotid arteriography was repeated 13 days after the second operation. The aneurysm was no longer visualized in the lateral and anteroposterior views. The left anterior cerebral artery was visible in the latter view but the right anterior cerebral artery was not filled with contrast medium.

The patient was last seen 1 month after ligation of the aneurysm. He felt well although he had some neurological abnormalities.

COMMENT

It was shown in this patient that ligation of the proximal portion of the right anterior cerebral artery, which apparently supplied the aneurysm, had no visible effect. On the contrary, the aneurysm was larger after the procedure, and was supplied with blood from the contralateral anterior cerebral artery. It was necessary to section the right anterior cerebral artery to obtain adequate exposure of the neck of the aneurysm and thus avoid inclusion of the left cerebral artery in the ligature. The postoperative course has not revealed any serious sequela, which might have been expected after closure of this artery, according to the experience of others.

We believe that postoperative arteriograms are of the utmost importance in the evaluation of the direct treatment of saccular aneurysms.

It must be remembered that the first operation in this case was performed during the so-called "acute period" of bleeding intracranial aneurysm and was well tolerated by the patient.
SUMMARY

A case is reported of a saccular aneurysm of the anterior communicating artery. The rarity of reported cases of this condition successfully treated by direct attack is stressed, except for the published series of Norlén and Olivecrona. Ligation of the anterior cerebral artery proximal to the anterior communicating artery proved to be inadequate, as shown by arteriograms made after the first operation. Subsequent "clipping" of the neck of the aneurysm resulted in a successful recovery.

REFERENCES