ARTERIOVENOUS ANEURYSMS OF THE BRAIN

REPORT OF TEN CASES OF TOTAL REMOVAL OF THE LESION

GÖSTA NORLÉN, M.D.

Neurosurgical Clinic, Serafimerlasaretet, Stockholm, Sweden

(Received for publication April 4, 1949)

During the past 20 years our opinion concerning the treatment of arteriovenous aneurysms has changed radically. Cushing and Bailey, and Dandy considered these lesions practically inoperable and recommended decompression and X-ray treatment. In a monograph on angiomatic malformations and tumours of the brain published in 1936 by Bergstrand, Olivecrona and Tönnis 5 cases are reported in which arteriovenous aneurysms of the brain were successfully completely removed. All the operations were performed by Olivecrona, the first one in 1932. At a meeting of the Scandinavian neurosurgeons in September 1946, Olivecrona and Riives gave an account of experiences gained during the past years (from July 1, 1935) in the surgical treatment of arteriovenous aneurysms of the brain. This report was published in May 1948, and included cases observed at the clinic from July 1, 1935 to August 31, 1946. In 24 of these 43 cases radical excision of the lesion was performed, with 3 fatalities. In the other cases various procedures were carried out, chiefly ligature of accessible arteries and the carotid artery. No appreciable benefit was observed from these procedures and it was felt that ligature of the carotid artery might even be dangerous. Olivecrona and Riives arrived at the conclusion that the choice of treatment lay between removing the lesion and leaving it alone. Recently Trupp and Sachs reported a series of cases of vascular tumours of the brain and spinal cord in which they attacked the lesion with electrocoagulation. By using a very low coagulating current and stroking along the vessel wall, they think it possible to shrink the very largest vessels and then obliterate them. No arteriograms were performed in these cases, but most of them were probably arteriovenous aneurysms. The value of the procedure seems to us a little uncertain. Even if it were possible to coagulate the superficially situated vessels, the main part of the lesion is usually deeply situated and cannot be reached by the coagulating current.

The number of reported cases of the successful removal of an arteriovenous aneurysm is very small. Penfield and Erickson report 2 cases in which a complete block removal had been done. Pilcher reports 3 cases, and Dott 7. From the roentgenograms of Pilcher’s cases it appears to us that at least 1 of the cases corresponds to the type of lesion we call a Sturge-Weber’s disease, which is a well defined anatomic and clinical entity, and should be differentiated from the arteriovenous aneurysms. Pilcher is of the opinion that most patients with these formidable lesions are amenable to, and should be given, the benefit of radical surgical removal.
The following cases represent all the intracerebral arteriovenous aneurysms removed by the author from July 1946 to December 1948. An attempt at removal of an arteriovenous aneurysm in the left frontal lobe was made in 1939 by the author in a case in which the aneurysm was supposed to be limited to the branches of the middle meningeal artery. The angiographic examination unfortunately had been limited to the external carotid artery and the true nature of the lesion was not recognized until the operation. The patient died on the table from uncontrollable haemorrhage. The case is reported in the paper by Olivecrona and Rüves\(^6\) (Case 13).

All the angiograms were performed after percutaneous injection of umbrodil (diodrast, perabrodil) into the carotid artery according to the technique described by Wickbom.\(^{11}\)

*Case 1.* N. A. N., male, student, aged 19 years. J. Nr. 561/46. In 1942 and 1945 the patient had had attacks of subarachnoid bleeding, the last of which was followed by left-sided hemiplegia. After this there was improvement, but a moderate left-sided spastic hemiparesis, especially of the leg, still remained. He had occasional slight headache. He was admitted to the neurosurgical clinic, July 1, 1946.

*Examination.* There was a slight left-sided central facial palsy. Moderate left-sided hemiparesis was present, more pronounced in the leg, with slight atrophia. Muscle reflexes were increased and Babinski sign was positive on the left. Optic discs were swollen about 1 D.

*Roentgenograms* of the skull did not reveal any pathological changes in its structure or vascular channels. Posteriorly, in the right parietal region, about 1 cm. from the mid-line, there was an irregular calcification the size of a pea.

*Angiography* (Fig. 1A and B). The anterior cerebral artery was enlarged and tortuous, and was the main feeding artery to an arteriovenous aneurysm the size of a walnut, located in the parietal region near the mid-line. From the aneurysm there were some large draining veins to the superior longitudinal sinus. The calcification seen in the roentgenogram was situated in the aneurysm.

*Encephalography.* There was no dislocation of the ventricular system. The upper part of the right lateral ventricle showed a slight local dilatation, behind which, at the level of the calcification, there was a slight depression of the upper wall of the ventricle. The left lateral ventricle showed no deformity.

*Operation* (July 16). As a first step, the internal carotid artery in the neck was exposed and a loop put around it, thereby making it possible to strangulate the artery if necessary. After opening the dura, some enlarged arterialized veins were found near the mid-line going to the superior longitudinal sinus. The medial surface of the hemisphere was carefully lifted away from the falx and the aneurysm was removed after ligating some large tortuous feeding arteries from the pericallosal artery. Immediately after extirpation, the patient was able to move his left leg, foot and toes. No blood transfusion was necessary.

*Postoperative Course.* The patient made a rapid recovery. The day after operation there was a slight weakness and feeling of numbness in the left arm, but these symptoms disappeared after a few days. In the left leg the weakness was perhaps a little more pronounced than before operation. There were no sensory disturbances. The patient left hospital on July 30.

A control examination was done on Sept. 6, 1946. There was a pronounced