Arteriovenous Angioma Derived from the Anterior Inferior Cerebellar Artery

Its Diagnosis and Treatment*

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The interest in this presentation centers around the rarity of an arteriovenous angioma arising from an anterior inferior cerebellar artery; the difficulty in determining whether it was an aneurysm or an arteriovenous angioma; the operative approach under the temporal lobe, with the ability to see the origin of the anterior inferior cerebellar artery from the basilar artery, the tentorium being filled with venous sinuses carrying mixed arterial and venous blood; and the clipping of the lateral branch of the anterior inferior cerebellar artery.

CSSE Report

876-16-49. K.Z., a 41-year-old nurse, while lying quietly in bed on May 7, 1963, suddenly experienced moderately severe pain in the back of the head. Following this she was unable to see and she had numbness in the region of the mouth and throat and difficulty in swallowing, all of which lasted about 20 min. She was dazed but not unconscious, and her neck became stiff. Following "two shots," her headache disappeared in 4 hrs.

Examination. There were no focal neurological signs. Spinal puncture revealed bloody spinal fluid under increased pressure. Bilateral carotid arteriograms on May 10 demonstrated a junctional dilatation at the origin of the posterior communicating artery on the left side.

On May 13, there suddenly developed severe generalized headaches, stiffness of the neck, nausea, and pain in the buttocks, posterior thighs, legs and feet.

Course. She refused to have further procedures done and the symptoms progressively improved and disappeared. She was kept in bed for 17 days, and in the hospital for 22 days. She resumed her normal activities 2 months following the first hemorrhage. She had occasional headaches which she described as tension headaches, but had no other symptoms until November 1, when "spasms" and burning pain developed, starting in the back of the head on the right side, extending over the scalp, the right side of the face and right side of the throat, but not the tongue. There was also mild stiffness of the neck. Symptoms were severe for 2 hrs., and lasted for 24-36 hrs. The fourth episode occurred on November 6, and the fifth on November 9. On November 11, she had her sixth subarachnoid hemorrhage, which started with pain in the right temporal region, stiffness of the neck, pain all over the head and a drawing feeling all over the face (actually the eyelids were opened only like slits, and the corners of the mouth were drawn back), nausea and vomiting. She noted double vision the next day and it disappeared in a few days. Bilateral carotid arteriograms did not demonstrate the site of bleeding. A vertebral arteriogram performed with a catheter by way of the femoral artery demonstrated what appeared to be an aneurysm of the right superior cerebellar artery.

On November 26, she was admitted to the Neurological Institute.

Neurological examination showed only a fine nystagmus on lateral gaze to either side, indistinctness of the superior poles of the optic discs, and mild fullness of the veins of the retina. A left vertebral arteriogram was performed. The left vertebral artery was small, and although the vessels intracranially were all filled they were not visualized adequately and the anomaly was not seen. A right vertebral arteriogram demonstrated what was believed to be an aneurysm of the right anterior inferior cerebellar artery. It arose approximately 2 cm. from the origin of this artery from the basilar artery and it measured 6 mm. × 4 mm. In one of the films only, what appeared to be an early filling vein was seen, suggesting a possibility of an associated arteriovenous angioma, or the possibility that the noted anomaly was indeed an arteriovenous angioma (Figs. 1, 2 and 3).

Operation. On Dec. 2, under a general anesthetic, and with the use of urea and hypothermia, the patient was placed in the lateral position and a right temporal craniotomy was performed. The incisura was approached, underneath the temporal lobe. Following evacuation of cerebrospinal fluid, the brain became very relaxed, especially so after the fluid was evacuated from the cisternae pontis and interpeduncularis. No resection of temporal lobe was necessary, but the vein of Labbé had to be sacrificed. The 4th cranial nerve was identified and followed forward to the point where it passed under the edge of the tentorium. The tentorium was clipped and divided just posterior to this point. It was then possible, by means of sharp dissection to separate the 4th nerve from the edge of the tentorium forward to the point where it entered the cavernous sinus. The tentorium was then incised farther anteriorly.

There were large venous sinuses within the tentorium, which were carrying mixed arterial and venous blood, indicating that an arteriovenous angioma was

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The angioma was located just below the tentorium, where it was firmly attached to the pons, and was displacing the 5th cranial nerve inferiorly and anteriorly. It was about 5 mm. in its greatest diameter, and approximately the same in length. It seemed to empty directly into a draining vein, which extended upward and laterally to empty into the superior petrosal sinus. At first the feeding artery could not be demonstrated. The basilar artery was well visualized, and it was followed inferiorly to the site of origin of the anterior inferior cerebellar artery. This artery was then followed superiorly for 2 cm. where it entered the angioma. At this point the anterior inferior cerebellar artery was clipped. The angioma collapsed immediately to one half its original size. By pressure upon the angioma it could be completely flattened. However, when the pressure was released it refilled slowly to approximately one half its original size. This appeared to be the result of venous filling by back flow from the superior petrosal sinus.

An attempt was made to dissect the angioma from the pons but it was so densely adherent to the pons that it could not be removed without damage to the pons. Consequently, it was decided to coat the aneurysm with Silversonic type of plastic material, namely the Latex and then A and B epoxy resin, in order to reinforce the walls should there be any unseen additional arteries supplying the angioma.

Postoperative course was not remarkable and she was discharged from the hospital on her 12th postoperative day. At that time she complained only of numbness of the right side of the face, and double vision. She walked with a slightly wide base, but was able to walk a straight line. Her station was normal and the nonequilibratory tests for coordination were performed well. Her strength was normal and the deep tendon reflexes were equal and hyperactive bilaterally. There were no pathological toe signs. Sensation was normal except for diminution of

Fig. 1 (left). Showing the anomaly just posterior to the basilar artery. It appears to be an aneurysm. The exact artery from which it arises cannot be stated.

Fig. 2. (right). This shows the anomaly and the possibility of an early filling vein leading from it. It was not possible to determine whether the anomaly was arising from the superior cerebellar or the anterior inferior cerebellar artery.

Fig. 3. Showing that the anomaly is arising from the anterior inferior cerebellar artery. The second concentration of contrast material is the result of overlapping of vessels.
sensation in all three divisions of the right trigeminal nerve, especially the first, and only very slight diminution in the second and third divisions. There was a mild ptosis on the right side and the pupils were equal and reacted well to light. There was no nystagmus. There was a slight decrease in movements of the right eye to the right side and superiorly. The jaws deviated to the right and hearing was slightly decreased on the right side.

Subsequent course. The patient was readmitted to the Neurological Institute on Feb. 12, 1964, and a right vertebral arteriogram was performed. The arteriovenous angioma was not demonstrated. The Olivecrona clip was found to be well placed upon the anterior inferior cerebellar artery (Figs. 4 and 5). The only positive neurological signs were a slight dilatation of the right pupil and less prompt reaction to light on the right than on the left. There was slight ptosis and intermittent diplopia on looking downward and outward. The extracocular movements were normal. There was minimal impairment of sensation in the first division of the right trigeminal nerve and the jaw deviated to the right side. Hearing was slightly decreased on the right.

Discussion

Although less than 50 cases of arteriovenous angioma in the posterior fossa have been reported in the literature, many more than this have been demonstrated arteriographically, and with the increasing arteriographic demonstration of the vertebral-basilar system an even greater number will be shown. Eventually the percentage of arteriovenous angiomata within the posterior fossa will be proportionate to the relative size of this part of the brain.

An arteriovenous angioma arising only from the lateral branch of the anterior inferior cerebellar artery is unique. In this case it could be called an arteriovenous fistula since the arterial blood seemed to empty directly into a vein.

This case emphasizes the need for good arteriography. When left vertebral arteriography was performed, all the vessels were shown but because of the small size of the left vertebral artery they were not well demonstrated. Therefore, one could not be certain that the vascular anomaly still existed. When the arteriogram was performed by way of the right vertebral artery, which was a larger artery, the vessels were shown better as was the arteriovenous angioma; only in the oblique view was it possible to determine that the anomaly arose from the anterior inferior cerebellar artery. However, even with multiple serigraphic films one could not be certain whether or not the anomaly was an aneurysm or an arteriovenous angioma.

The approach under the temporal lobe was the usual one with the patient in the lateral position. It was necessary to sacrifice the vein of Labbé since it was under considerable tension with shrinkage of the brain as a result of the urea and hypothermia. Greater anterior exposure of the posterior fossa was obtained by dissecting the trochlear nerve from the tentorium, allowing the tentorium to be divided farther anteriorly. It was then possible to visualize better the anterior part of the posterior fossa, to see the origin of the anterior inferior cerebellar artery from the basilar artery and to follow it superiorly to the anomaly.

The absence of filling of the angioma in the postoperative arteriogram indicates that the only artery supplying it was the one that was ligated. It is believed that the postoperative 3rd, 5th, 6th and 8th cranial-nerve signs were caused by the
drying effect of the helium which was used in the procedure of applying the Selverstone plastic coating, in spite of effort to prevent it. The impairment of the trochlear nerve which developed after the patient was discharged from the hospital is thought to be the result of pressure by one of the silver clips on the edge of the tentorium.

Summary

A unique case of subarachnoid hemorrhage resulting from rupture of an arteriovenous angioma arising from an anomalous right anterior inferior cerebellar artery was presented. Diagnosis, surgical treatment and subsequent course were discussed.