THE COLLATERAL CIRCULATION FOLLOWING MIDDLE CEREBRAL BRANCH OCCLUSION

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Angiographic demonstration of occlusion of the main stem of the middle cerebral artery has been reported in a number of instances, and the peripheral collateral circulation following such occlusion has been illustrated on several occasions. The criteria for demonstration of these features are (1) failure of the middle cerebral vessel to fill beyond a point of obstruction, and (2) delayed retrograde filling of the cortical branches of the middle cerebral artery from branches of anterior and posterior cerebral arteries. The angiographic features of middle cerebral branch occlusion have not received so much attention. The following is presented because of the interesting pattern of collateral circulation observed and also because the events illustrate some features of the natural history of cerebral vascular disease now recognized to be important.

CASE REPORTS

Case 1. The patient was a 36-year-old man who had been healthy apart from attacks of malaria contracted in 1943 when overseas and continuing until 1947. In 1948, he began to experience sudden episodes of dizziness and blurring of vision, with numbness around his mouth on both sides and inability to speak. By 1950, the attacks also included weakness and numbness of the right arm and leg, lasting from several minutes to half an hour, and followed by general malaise for several weeks. From the onset, the average frequency of attacks was one per month, although in the 5 months prior to admission he had been quite free.

On June 25, 1954, the patient went to bed feeling well. His wife awakened at 7:30 A.M. June 26, and saw the patient rubbing his right arm with the left hand and moving his tongue about in his mouth. He was unable to speak or to use the right arm and leg. He was admitted to the Denver Veterans Administration Hospital that morning.

Examination. The ocular fundi and eye movements were normal. There was inattention to objects in the right field of vision, but in answer to direct questioning he indicated that he did see objects in that field. There was profound right hemiparesis, together with depressed tendon reflexes and an indefinite plantar response on that side. The right superficial abdominal reflexes could not be elicited. He was unable to speak, and though unable to respond to verbal commands did appear to understand some of what was said to him. Blood pressure was 125/80. Plain radiographs of the skull revealed no abnormality. It was thought that there might be a
left internal carotid artery occlusion, but the possibility of a bleeding vascular anomaly in the left hemisphere was also considered.

Angiography. On the afternoon of admission, left carotid angiography was carried out. For the anteroposterior film, 8 cc. of 35 per cent diodrast were injected, and 4 exposures were made at 1-sec. intervals. Subsequently, two further injections were made for stereoscopic lateral series, the time intervals being the same.

On the first film of the anteroposterior series (Fig. 1), made just before the completion of the dye injection, there was seen to be obstruction of the superior of the two visible branches of the middle cerebral artery, 2 cm. from the carotid bifurcation. In addition, there was noted a paucity of vessels in the peripheral distribution of the ascending branches. On the first film of the lateral series (Fig. 2) there was good filling of the posterior temporal branch, but no filling in the territory of distribution of the ascending frontoparietal or parietal branches. On the second film, made 1 sec. later (Fig. 3), reflux filling of these branches from internal frontal, paracentral, and precuneal branches of the anterior cerebral artery was shown. This filling persisted into the next frame (1 sec.).

Course and Treatment. Immediately after arteriography, the patient’s paralysis became worse, but several hours later it had returned to the pre-arteriography level. He continued to improve in strength, and his speech returned. He left the hospital, and has not responded to requests to return for examination.

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**Fig. 1. Case I.** There are two visible branches of the middle cerebral artery, one of which (A) is obstructed. Note the paucity of vessels in the peripheral area of supply of the middle cerebral artery (B).