Spontaneous Bilateral Recanalization in Bilateral Internal Carotid Artery Occlusion

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SUMMARY The authors report a young woman with bilateral internal carotid artery occlusion shown by carotid angiography. There was spontaneous bilateral recanalization demonstrated radiographically. The possible causes, e.g. the intake of oral contraceptive drugs, a spontaneous intimal dissection and other etiological features are discussed and the literature is reviewed.

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BILATERAL OCCLUSION of the internal carotid arteries is often found in adults of middle and older age with risk factors such as atherosclerosis, hypertension, cardiovascular disease, diabetes mellitus and lipid metabolism abnormalities.1-7

Unilateral and bilateral occlusive disease of the internal carotid arteries has been reported also in young adults, with or without these risk factors.5-12

Spontaneous recanalization of one of the obstructed vessels has been described in both age groups,18-20 although it has been predominantly observed with occlusions of the middle cerebral artery.14-16, 17

Radiographic documentation of recanalization is rarely obtained because of the lack of an indication for another neuroradiological investigation, such as angiography, in these patients with a stable clinical state.

Internal carotid artery occlusions in young women using oral contraceptive medication was described first by Lorentz18 in 1962 and later by Wolf,19 de Gennes,20-22 Cole,23 Mandel,24 Mumenthaler,25 Pesendorfer,26 and others.27-30 Only one patient with bilateral thrombosis of the internal carotid arteries, a young woman using oral contraceptives, has been reported (Mandel22 in 1969). In this patient recanalization did not occur and she died in a decerebrated state. We report a patient with bilateral internal carotid artery occlusion in whom there was bilateral spontaneous recanalization proven radiologically.

Case Report

The patient was a 33-year-old white American woman. She was admitted to the neurology department of the Bernese University on April 3, 1971, because of sudden loss of speech, nausea and right facial palsy. There was no loss of consciousness. Examination confirmed a right-sided facial palsy of the upper motor neuron type, some buccolingual apraxia, a discrete right hemiparesis without any sensory loss and an almost complete motor aphasia. Subsequent carotid angiography on both sides revealed an occlusion of the left internal carotid artery located 1 cm distally to the bifurcation of the common carotid artery and an occlusion of the right internal carotid artery at the level of the atlas.

There was collateral circulation via the ophthalmic arteries on both sides (fig. 1A, B). Her blood pressure showed 140/80 mm Hg at several recordings. Her red and white blood count showed erythrocytes within normal range, leucocytes 4000/mm³ with mild shift to the left. Hemoglobin was 15.3 g % hematocrit 46%, thrombocytes 50000/mm³, Quick 100%, percent thromboplastin time 46 sec, thrombin time 10.3 sec, fibrinogen 320 mg %. Factors I, V, VII and X were within normal range. Electrolytes and the blood lipid contents were: total cholesterol 159 mg/100 ml, triglycerides 55 mg/100 ml, phosphatids 167 mg/100
ml, total lipid content 475 mg/100 ml, all within normal range. An electrocardiogram was normal.

The patient had been taking oral contraceptives (type unknown) for 7 months and had mild headaches 2 weeks prior to admission. During the following weeks her aphasia improved gradually with intensive speech therapy. Her facial palsy and the right-sided hemiparesis decreased. She was discharged April 21, 1971, receiving anticoagulant medication.

A brain scan in the third week after the cerebrovascular accident showed a wedge-shaped enhancement in the left frontotemporoparietal region which was thought to be compatible with anemic softening of cerebral tissue. Speech therapy was continued after discharge from the hospital and at the last examination in Bern, August 15, 1971, only mild motor dysphasia remained. The patient returned to the U.S.A.

Bilateral carotid angiography was repeated 7 years later prior to planned hip surgery. The angiograms showed complete recanalization of both internal carotid arteries with normally shaped arterial walls at the site of the previous occlusions (fig. 2 A, B). Apart from some minimal expressive aphasia, the neurological examination was normal.

Discussion

The first angiographic documentation of a bilateral occlusion of the internal carotid arteries was reported in 1942 (Tolle\textsuperscript{31}). Subsequently other cases were reported by Alajouanine,\textsuperscript{2} Groch,\textsuperscript{3} Castaigne,\textsuperscript{4} Sanabria\textsuperscript{5} and others,\textsuperscript{1, 5, 12} mostly in patients in the middle and upper age group and usually related to atherosclerosis. Survival with bilateral occlusion of the major cerebral feeding vessels depends on the immediate establishment of a sufficient collateral circulation and is, therefore, most often restricted to the younger age groups. According to Louis,\textsuperscript{32} there is rarely a simultaneous onset of bilateral carotid occlusion in elderly patients.

The occurrence of thromboembolic occlusions of the internal carotids with oral contraceptives has been described by several authors.\textsuperscript{13-30} There is still no fully conclusive evidence for a hypercoagulable state or increase of thromboembolic phenomena in spite of the increase in various clotting factors — thrombocytes, prothrombin and fibrinogen (Wolf,\textsuperscript{19} Egeberg and Owren\textsuperscript{33}) — in patients using oral contraceptives. But there appears to be statistically significant correlation between cerebrovascular accidents in young women and use of the contraceptive pill.\textsuperscript{34, 35}

Mozes\textsuperscript{36} described unilateral internal carotid artery thrombosis in a patient receiving human chorionic gonadotropin stimulation for infertility. An increase in blood viscosity or a body fluid imbalance were said to be of etiological importance. On the other hand, thromboembolic accidents are more likely to occur during the puerperium, when blood factors return to normal values, than during pregnancy with its well-known imbalance in blood factors.

The relation of oral contraceptive use to our patient’s carotid disease is strongly suggestive but unproven. The fact that the thrombotic clot did not project into the carotid bifurcation as is usual in pure thrombotic occlusions associated with atherosclerosis raises the suspicion that we might have been dealing with a bilateral spontaneous intimal dissection of the internal carotids as described by Ehrenfeld\textsuperscript{37} and others.\textsuperscript{38-43} This phenomenon is said to occur spontaneously,\textsuperscript{37} in association with degeneration of the media\textsuperscript{38} or secondarily to trauma such as deceleration injury or violent sports activity.\textsuperscript{44} The lesion consists of extravasation of blood between the intima and the media of the carotid artery through a transverse intimal tear. This may result in a dissecting aneurysm in some cases.\textsuperscript{38-43} Ehrenfeld\textsuperscript{37} operated upon 12 of his 19 cases reported in 1976, and considerable improvement.
of luminal diameter occurred in 6 of 7 patients whose arteries were left undisturbed. None of his patients had a history of previous trauma, 5 patients were hypertensive, 3 showed angiographic signs of contralateral fibromuscular dysplasia of the internal carotid artery and only 3 of his 10 female patients had taken birth control pills. A case of bilateral dissecting aneurysm of the internal carotids has been reported by Lloyd. The phenomenon of spontaneous recanalization has been described by Sindermann, Dichgans, Fieschi, and Yarnell but to our knowledge a bilateral restoration of flow has not yet been reported.

The natural history of large intraluminal clots is still unclear. The possibilities of evolution are: progressive thrombosis, distal embolization by fragments or the entire clot, and stabilization or disappearance by fragmentation or lysis without causing any further distal embolic phenomena. This spontaneous lytic process can be enhanced by injecting plasmin or plasminogen but also occurs spontaneously due to tissue fibrinolytic activity in, or very near to, the endothelium of the affected artery (Sherry, Todd). The fact that spontaneous recanalization may, as in our patient, take place bilaterally becomes important in considering carotid endarterectomy or extracranial — intracranial bypass surgery.

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