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Eversion endarterectomy and re-implantation in carotid stenosis and distal kink[☆]



Endarterectomía por eversión y reimplante en una estenosis carotídea y un bucle distal

Kinking and coiling of the arteries are rare morphological alterations of the internal carotid artery (ICA) described as the most frequent sole cause of cerebrovascular insufficiency (CI), or as a combined cause together with carotid atherosclerosis. Although incidence of kinking and coiling of the ICA has been estimated to range from 10% to 16% in the general population, only 4% to 16% of these features cause symptomatic CI.^{1,2} Their natural course seems to be benign, and these alterations are asymptomatic in most cases. Morphological diagnosis is easy to determine with the help of current imaging techniques, but it is essential to determine, by means of a neurological examination and transcranial Doppler ultrasound, whether the anomaly is causing cerebral ischaemia.

This letter presents the case of a patient with carotid stenosis and distal kink.

Our patient is an 80-year-old man, a former smoker of one packet a day during 60 years with a medical history of arterial hypertension treated with 2 antihypertensive drugs (losartan and hydrochlorothiazide); he was also fitted with a cochlear implant. The patient visited the emergency department due to an episode of left-sided hemiparesia, plegic left arm, dysarthria, and amaurosis fugax of the right eye; symptoms had been present for several hours without remitting fully. Physical examination revealed left supranuclear facial paresis, distal brachial paresis with a tendency to pronation of the left forearm, and crural paresis with slow claudication after 10 seconds. Right flexor plantar reflex was observed.

A Doppler ultrasound of the supra-aortic trunks revealed a heterogeneous and irregular plaque in the right carotid bifurcation, preocclusive stenosis (70%-99%) of the right internal carotid (RIC), and homogeneous plaque with moderate stenosis in the left internal carotid (LIC). Transcranial Doppler ultrasound showed the right middle cerebral artery (MCA) to be less curved than the left one. Head CT showed necrosis on the right superior parietal postrolandic area, and signs of diffuse brain atrophy (Fig. 1). A subsequent com-

puted axial tomography angiography of the brain and neck revealed a fibrolipid atheromatous plaque on the proximal third of the RIC causing critical stenosis (90% approximately) and coiling of the distal third of the RIC. Intracranial images showed a total occlusion of the M3 segment of the MCA. The LIC showed an atheromatous plaque causing moderate stenosis (50%-70%).

The patient started treatment with antiplatelet drugs (ASA 300 mg) and statins (atorvastatin 80 mg). Twenty-four hours after the patient was admitted, his motor symptoms on the left side improved with only the tendency towards left forearm pronation persisting. Six days later, after the presurgical evaluation and brain reserve test had been carried out, the surgery was performed with the patient under general anaesthesia (Fig. 2). Surgery involved complete resection of the right ICA, eversion endarterectomy (TEA) and reimplantation of the ICA (by lateroterminal anastomosis) on the common carotid to remove the kink. The post-operative period was uneventful, with no neurological focal signs or other complications.



Figure 1 Cranial CT scan showing necrotic lesion on the right superior parietal area.

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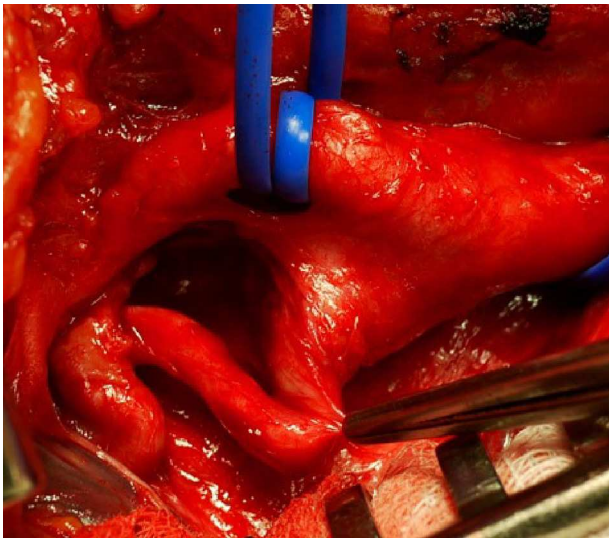


Figure 2 Coil in the right internal carotid.

Since that period, and also during long-term follow-up, the patient has remained asymptomatic and no new symptoms have been detected. Yearly follow-up Doppler ultrasounds of the supra-aortic trunks show adequate permeability of the right ICA and stable stenosis of the LIC.

Some of these malformations can be due to an insufficiently descended heart or a persistent embryonic configuration.

However, embryological development is not the only aetiology, since the appearance of kinking has also been related to abnormalities on vascular walls that are secondary to atherosclerotic changes or modifications to the internal elastic lamina. Coiling clearly seems to be congenital, while kinking is secondary to atherosclerotic disease or abnormalities on vascular walls that may in turn be affected or exacerbated by haemodynamic changes.^{3,4}

Clinical manifestations are more frequently associated with carotid artery kinking than coiling, and they are more frequent when atherosclerosis is also present. It remains uncertain whether elongation due to a congenital malformation is the primary condition, and if turbulences then cause formation of atherosclerotic plaque; or if atherosclerosis and other problems such as hypertension primarily weaken vascular walls, thereby leading to a secondary kinking of the carotid.⁴

Considering that numerous carotid kinks and coils are asymptomatic, merely describing the lesion is not sufficient. Instead, we should determine whether the lesion causes vessel stenosis, the degree of stenosis, and if it causes CI.

In addition to the neurological examination, studies used to assess whether a kink or coil is causing CI include oculo-plethysmography, transcranial Doppler ultrasound, cerebral parenchyma studies based on CT or MRI scans, colour Doppler ultrasound, arteriography, computed axial tomography angiography, and magnetic resonance angiography.^{4,5}

In adult patients with cerebrovascular ischaemic symptoms, kinks of the internal carotid are frequently associated with atheromatosis of the carotid bifurcation. When these

two lesions coexist in symptomatic patients, surgical treatment is indicated. This procedure involves endarterectomy of the atheromatous plaque and correction of the kinks.

The main indication for surgical treatment to repair kinks and coils of the ICA, with no coexistence of atherosclerotic lesions, is presence of neurological symptoms. However, establishing the relationship between the carotid tortuosity and the patient's symptoms is difficult in these cases.

Another important step is ruling out other diseases that are able to provoke neurological deficit.

Surgery is contraindicated in cases of neurological instability, cerebral infarct with severe sequelae, severe intracerebral atheromatosis, and post-stroke cerebral oedema visible on a CT or MRI scan.

The aim of surgical treatment for kinks and coils is to prevent carotid thrombosis and cerebrovascular infarct, as well as to maintain cerebral perfusion. Therefore, treatment should offer a better outcome than the natural progression of the disease.^{6,7}

Conflicts of interest

The authors have no conflicts of interest to declare.

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