

Striatocapsular infarction: MRI and MR angiography

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Abstract. We present a case of left striatocapsular infarction manifest clinically as a transient right hemiparesis. MRI showed a left striatocapsular infarct. Striatocapsular infarction, unlike lacunar infarction, is often associated with occlusive disease of the carotid artery. In order to screen the carotid vessels, cervical MR angiography (MRA) was performed during the same examination, demonstrating a left internal carotid artery occlusion, confirmed by contrast arteriography. MRA, a noninvasive modality, can be a useful adjunct to MRI, when diagnostic information concerning the cervical carotid artery is needed.

Key words: Carotid arteries, MR studies – Carotid arteries, occlusion – Brain, ischaemia

Striatocapsular infarcts, unlike lacunar infarcts, are an indication for imaging of the carotid arteries. We describe a case in which combined MRI and MR angiography provided all the relevant data.

Case report

A 44-year-old right-handed woman experienced sudden onset of aphasia and right brachiofacial weakness without hemisensory disturbance. Her blood pressure was normal and no cervical bruits were found. Laboratory blood analysis, electrocardiogram and echocardiography were normal. Her only risk factor was smoking (10 packets/year). CT 3 days later revealed a low density comma-shaped lesion involving the head of the left caudate nucleus, the anterior limb of the internal capsule and the putamen (Fig. 1). MRI was performed the next day on a 1.5 Tesla imaging system. T1-weighted sagittal and T2-weighted axial images showed increased signal in the same location as that in CT (Fig. 2). The diagnosis of a large striatocapsular infarct in the territory of the lateral group of lenticulostriate arteries was made. Its haemorrhagic component was revealed only on MRI.

Despite the normal appearance of the carotid siphon on MRI, cervical MR angiography (MRA) was performed during the same examination, using a sequential two-dimensional (2DFT) time-of-flight technique. Projection MR images were created using a maximum-intensity-projection (MIP) algorithm. Complete occlusion of the left internal carotid artery (ICA) was found; the right carotid

artery and vertebrobasilar system were normal (Fig. 3). Digital subtraction angiography confirmed the left ICA occlusion (Fig. 4). The blood supply of the affected hemisphere was derived from cortical anastomoses via the posterior and anterior communicating arteries. The patient recovered ten days later and neurological examination was normal.

Discussion

Striatocapsular infarction has recently been described [1] as a distinct form of subcortical infarction. Distinct size, shape, position, pathogenesis and clinical features distinguish it from lacunar infarction. Striatocapsular infarcts involve the territory of the medial and lateral lenticulostriate branches of the middle cerebral artery, sparing the overlying cortex [1, 2]. The clinical syndrome usually includes hemiparesis, affecting mainly the upper limb, with aphasia, neglect or apraxia.

CT and MRI demonstrate a lesion conforming to the area of supply of the lenticulostriate arteries. The lesion is triangular, lentiform, or typically comma-like, with its rostral portion in the head of the caudate nucleus and anterior limb of the internal capsule, and its tail in the putamen. The maximum diameter is usually about 3 cm, with a lower limit of 2 cm, chosen because this is the arbitrary cut-off size for lacunes [3, 4].

The lenticulostriate arteries are end-arteries, whereas the cortical branches of the middle cerebral artery (MCA) have transcortical and transdural anastomoses. Most of the lenticulostriate arteries arise from the M1 segment of the MCA. Three main pathophysiological subgroups of striatocapsular infarction can be identified: 1. cardiac emboli to the origin of striatocapsular arteries; 2. severe extracranial carotid occlusive disease with presumed embolism to the same site, or haemodynamic disturbances; 3. stenosis of the M1 segment of MCA occluding the origin of small vessels [5, 6]. In these circumstances, collateral flow from the anterior cerebral artery may take over much of the function of the superior division of the ipsilateral MCA while collateral flow from the posterior circulation may supply the territory of the inferior division of the MCA and thus preserve cortical tissue.

Whereas striatocapsular infarcts are usually related to large-vessel disease, lacunar infarcts follow occlusion of

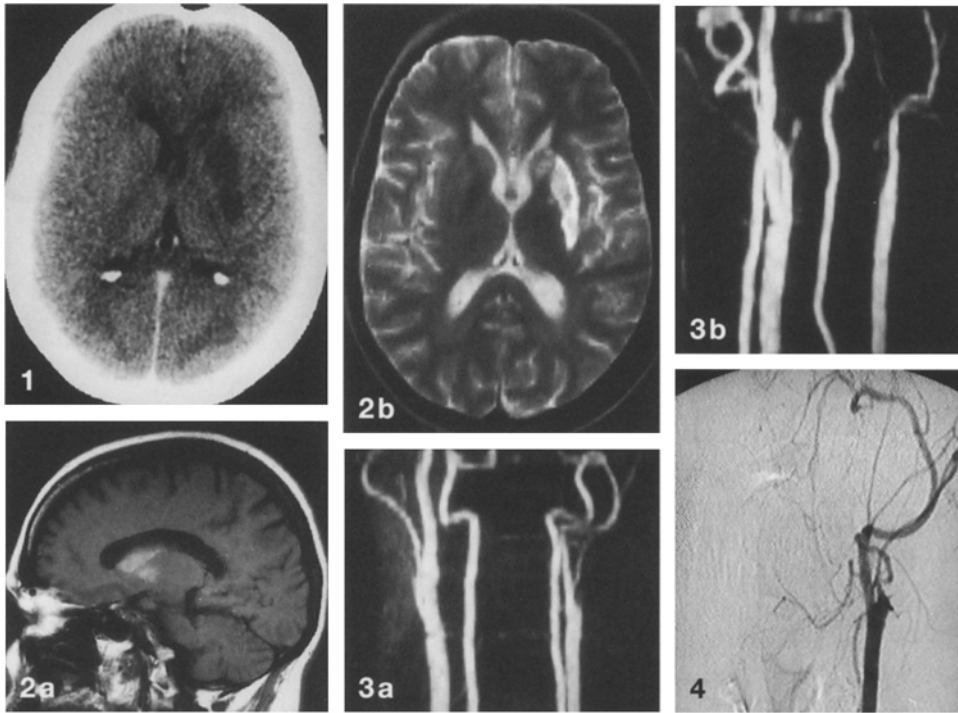


Fig. 1. Contrast-enhanced CT shows a comma-shaped low density lesion, involving head of the left caudate nucleus, the anterior limb of the internal capsule and putamen

Fig. 2. **a** T1-weighted sagittal and **b** T2-weighted axial MRI shows a high signal intensity lesion, indicating a slightly haemorrhagic striatocapsular infarct

Fig. 3. MRA (2DFT) in **a** frontal and **b** oblique projections demonstrate a complete left internal carotid artery occlusion. The right carotid and vertebral arteries are normal

Fig. 4. Left common carotid angiogram confirms the complete occlusion

single long penetrating arteries, e. g., lenticulostriate artery. They have been ascribed to a disseminated lipohyalinosis of small vessels which may progressively occlude different arteries, leading to a lacunar state [3, 4]. It is therefore assumed that angiography is not indicated if the history or imaging investigations suggests lacunar infarction, as any disease of the carotid arteries is likely to be coincidental.

Weiller et al. [5], and Donnan et al. [6] reported 29 and 27 cases respectively in which conventional cerebral angiography was performed on patients with striatocapsular infarcts; they found severe carotid artery occlusive disease in 31 and 44 % of cases.

Contrast arteriography remains the definitive investigation for carotid artery disease. However, the invasiveness of this technique and its risks, particularly in patients who are asymptomatic or with improving, are drawbacks that strongly call for the development and implementation of alternative diagnostic methods. The accuracy of Doppler sonography is suboptimal [7]. MRA is poised to replace Doppler sonography for screening and staging of carotid artery lesions. This noninvasive modality allows demonstration not only of the cervical vessels, but also of the intracranial arteries, with the advantage of imaging in numerous projections. Previous studies have shown a good overall correlation with angiography [8, 9], and Anderson et al. [10] showed that critical stenoses and occlusions could be differentiated; good correlation in grading of carotid lesions was obtained.

In our case, the combination of MRA and MRI showed both the ischaemic insult to the brain and its aetiology, a left ICA occlusion. The normal appearance of the carotid siphon on MRI was consistent with revascularisation of the terminal carotid artery via anastomoses. Despite the ability of MRI to demonstrate vessel thrombosis, MRA is better for assessment of carotid ar-

tery occlusive disease. This is particularly true in patients with striatocapsular infarcts, since ICA stenosis is more frequent than complete thrombosis (18 and 6 cases respectively in one series [6]). Carotid artery occlusion is infrequent in young adults, although sporadic cases and small series have been reported.

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