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A pure sensorimotor stroke due to cervical vertebral artery occlusion

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Abstract

We reviewed the case history of a 45 year-old women, who presented a pure right sensorimotor stroke, due to a left paramedial medullary infarct as result of a left cervical vertebral artery occlusion. The unusual location of the infarct could be explained by the combination of an anatomical variant of the left branch of the anterior spinal artery and the presence of a deep cervical artery, issued from the costo-cervical trunck. This collateral circulation allowed that the lateral and upper medulla was not infarcted.

Key words : Cervical vertebral artery occlusion ; medial medullary infarct ; anatomical variant of a branch of the anterior spinal artery ; collateral circulation by the deep cervical artery.

Introduction

Proximal vertebral artery occlusion causes mainly a lateral medullary infarct (Caplan 1979 ; Kim *et al.*, 1995 ; Lucas *et al.*, 2000 ; Kataoka *et al.*, 2003). Medial medullary infarcts due to a vertebral artery occlusion are rare (Kim *et al.*, 1995). We describe a patient with a medial medullary infarct, caused by a proximal cervical vertebral artery thrombosis, and with a pure right sensorimotor stroke as clinical presentation.

Case report

A 45 year-old woman, with a history of cigarette smoking and supraventricular extrasystoles treated with bisoprolol, was admitted with sudden complaints of paraesthesias and weakness in the right arm and leg. The sensorimotor hemisyndrome worsened over the next 24 hours with temporary nausea and somnolence. The neurological examination on admission revealed a moderate paresis of the right arm and leg, without clear facial or bulbar involvement, nor with speech disturbances. The hypoaesthesia involved the whole right hemisoma, including the face, with a loss of position, vibratory and discriminative senses. The tendonreflexes were symmetrical but a right Babinski sign was present.

A computed tomographic scan of the brain on admission showed no abnormalities. Magnetic resonance imaging (MRI) with selective slices through the lower brainstem and upper cervical spine, revealed a small left anterior, paramedian, hyperintense signal in the lower medulla on T2-weighted images, with corresponding positive diffusion weighted images (Fig. 1a-b). No other lesions were observed. Extensive cardiac investigations were unremarkable. Brainstem and somatosensory evoked potentials were normal. The motor evoked potentials were consistent with a left corticospinal tract involvement. Laboratory investigations, including rare hereditary thrombotic, autoimmune and infectious (herpes simplex, varicella zoster, borrelia, Cytomegalic virus) causes were normal or negative. The cerebrospinal fluid examination was unremarkable. A digital subtraction angiography of the carotid and vertebral arteries revealed a proximal occlusion of the left vertebral artery up to the level of C2. A deep cervical artery, issued from the costo-cervical trunk, itself derived from the subclavian artery, filled the post-occlusive and intracranial segment of the left vertebral artery above the level of C2. The branches of the anterior spinal artery were not visible (Fig. 2a and b).

The patient was initially treated with heparin for a few days, and afterwards, with acetyl-salicylic acid. She recovered almost completely within 3 months.

Discussion

We present this case report because the clinical presentation is unusual for a cervical vertebral artery occlusion and to attract the attention on the complex vascularization of the medulla oblongata.

The clinical presentation of a vertebral artery occlusion is variable (Caplan, 1979 ; Labauge *et al.*, 1987 ; Kim *et al.*, 1995 ; Wytik *et al.*, 1998 ; Lucas *et al.*, 2000 ; Salari-Namin and Cohen, 2000 ; Katoaka *et al.*, 2003), but most frequently a lateral medullary syndrome is observed (Caplan, 1979 ; Kim *et al.*, 1995 ; Lucas *et al.* 2000 ; Katoaka *et al.*, 2003). The present patient had only a pure right sensorimotor hemisyndrome, that

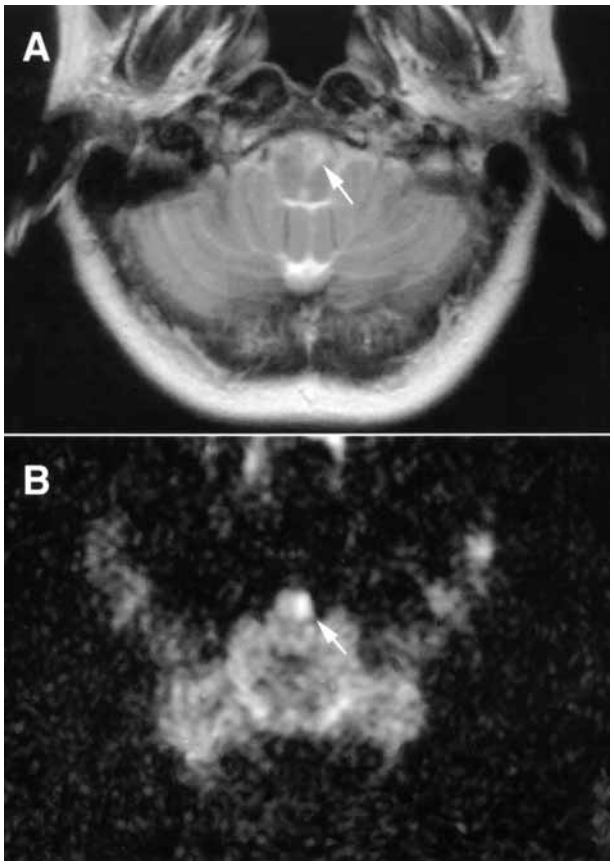

FIG. 1A. — A. T2 weighted image of the lower brainstem and cerebellum showing the anterior medial hyperintensity on the left side (arrow) ; B. Diffusion weighted images showing the corresponding ischemia at the level of the anterior medial portion of the lower medulla oblongata (arrow).

could have suggested an hemispheric or an upper-brainstem stroke. MRI vizualized, however, a low medullary ischaemic lesion in the vascular territory of the left branch of the anterior spinal artery. This medial medullary infarct embraced the pyramid and the medial lemniscus (Kim *et al.*, 1995 ; Kumral *et al.*, 2002). The lateral and upper parts of the medulla were spared (Fig. 3).

Medial medullary infarcts are rare and represent only 1% of cases of vertebro-basilar stroke (Kim *et al.*, 1995 ; Bassetti *et al.*, 1997 ; Kumral *et al.*, 2002). The most common causes of these infarcts are an atherosclerotic stenosis or occlusion, and a dissection of the ipsilateral vertebral artery (Kim *et al.* 1995 ; Bassetti *et al.*, 1997 ; Kumral *et al.*, 2002). The mean discussion in this case report is to explain the occurrence of a low medial medullary infarct in the territory of the left branch of the anterior spinal artery, in case of an occlusion of the proximal upper cervical segment of the left vertebral artery. The anterior spinal artery is commonly formed rostrally by the union of the descending anterior spinal branches issued from the intracranial part of both vertebral arteries in 75% of the cases, with a balanced or a dominant right or left branch (Govsa *et al.*, 1996). However, there exists

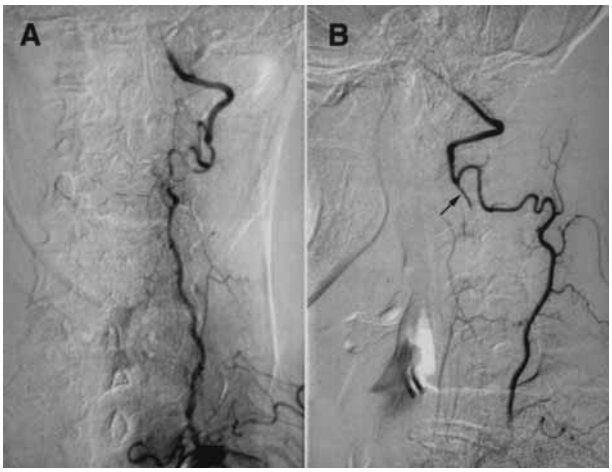

FIG. 2A. — A. Early arteriogram, showing the occlusion of the left proximal vertebral artery. The deep cervical artery fils the extradural artery by the posterior longitudinal anastomosis at the level of C3 ; B. Late arteriogram showing the backflow of the distal part of the occluded left vertebral artery (arrow). The proximal branches of the anterior artery are not visible.

a number of anatomical variants. An unilateral origin is observed in 11.3%. In 13.7% one branch of the anterior spinal artery originates more caudally, from an intervertebral transverse anastomosis at various levels (Govsa *et al.*, 1996). The presence of a similar anatomical variant of the left branch of the anterior spinal artery, originating from the more proximal cervical segment of the vertebral artery, has to be postulated in the present case as it can explain why the vertebral occlusion at that side had caused the left medial medullary infarct in the present patient. The patent collateral circulation through a deep cervical artery, supplying the intracranial and distal part of the occluded left vertebral artery above the level of C3 makes clear why the lateral and upper part of the medulla remained

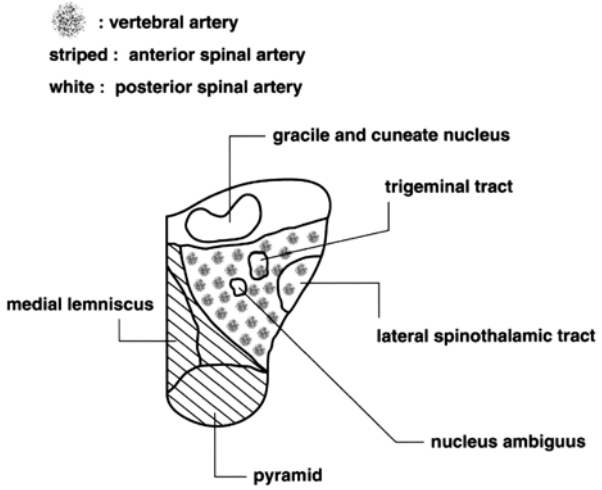

FIG. 3. — Schematic drawing of the vascular territories of a lower half of the medulla oblongata, with its most important structures.

spared. This explanation is, however, hypothetic as the origin of the spinal branches of the anterior spinal artery could not be demonstrated on angiography.

The anastomotic pathways of the vertebral artery are complicated (Fields *et al.*, 1965),. The principal collateral pathway, in cases of proximal vertebral artery occlusion, is an anastomosis between the occipital artery, originating from the external carotid artery, and the muscular branch of the vertebral artery at the level of C1 and C2. Secondary pathways are the intraspinal intervertebral anastomoses. A third, less frequent collateral pathway, as in the present case, can exist through a deep ascending cervical artery that originates from the costo-cervical trunk, that itself arises from the subclavian artery. This deep ascending cervical artery makes an anastomosis with the distal part of the vertebral artery. Finally the vertebral artery can have a second, more proximal, anastomosis with the ascending cervical artery at the level of C3.

The present case illustrates that the large variability of the collateral circulation of the vertebral artery can give rise to surprising clinical syndromes in case of vertebral artery occlusion. Whenever one does not find a responsible hemispheric or an upper-brainstem lesion on neuroimaging in case of a pure sensorimotor stroke, the possibility of an ischemic lesion in the vertebral artery territory should be suspected.

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