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Bilateral posterior medullary and cervical stroke: a case report

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Abstract Spinal strokes are often localised in the anterior spinal artery territory, whereas an involvement of the posterior spinal arteries (PSA) is uncommon, and usually unilateral. Bilateral PSA stroke is exceptional. A 70-year-old woman, after a mild head trauma, presented with cervical pain, left hypoaesthesia and sensitive ataxia, which then extended to the right hemibody, including face. A Doppler ultrasound showed an only systolic flow signal in the left vertebral artery (VA). MR showed a bilateral infarction extending from the posterior medulla oblongata to C4 and a left hypoplastic VA with lack of visualisation of the V3 segment. This case was peculiar, implying a bilateral stroke in the PSA territory, possibly related to a left VA dissection, and in the presence of a dominant PSA, originating from the hypoplastic VA and of hyposupply of posterior radiculomedullary arteries and anastomoses.

Key words Bilateral posterior cervico-medullary stroke • Posterior spinal arteries • Vertebral artery dissection

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Introduction

Spinal cord infarctions are rare if compared with brain ischaemic strokes and they account for 1.2% of all strokes [1]. They are often localised in the anterior spinal artery (ASA) territory, where they are usually bilateral, whereas an involvement of the posterior spinal arteries (PSA) territory is uncommon, and usually unilateral [2]. In these cases the most common location is the thoracic-lumbar region, whereas the involvement of the cervical segment (especially C2–C3) is occasional [3]. Also dorsal medullary infarcts are infrequent [4], when medullary and cervical ischaemia are reported they usually are either lateral [5] or medial [6]. Rare papers have reported infarctions of the area supplied by the combination of the posterior inferior cerebellar artery (PICA) and PSA [7], of the ASA and PSA [5], and of the PICA and ASA [8].

We report an unusual bilateral PSA stroke extending from bilateral dorsal medulla oblongata to bilateral posterior cervical cord at C4 level.

Case report

A 70-year-old woman was admitted to a local hospital after the acute onset of an excruciating, throbbing and stabbing pain of the left cervical and occipital regions. The day after she developed numbness and paraesthesias of the left face, which extended to her left hemibody, with left ataxia and acute urinary retention. One week after the pain onset, the patient was transferred to our hospital for the appearance of numbness, paraesthesias and ataxia also on the right hemibody, including face. The patient had no history of hypertension, diabetes, cardiac disease or migraine. Two weeks before she experienced a mild head trauma without consciousness loss, for which she did not seek medical attention. Neurological examination showed a first grade horizontal nystagmus in the lateral gaze, and

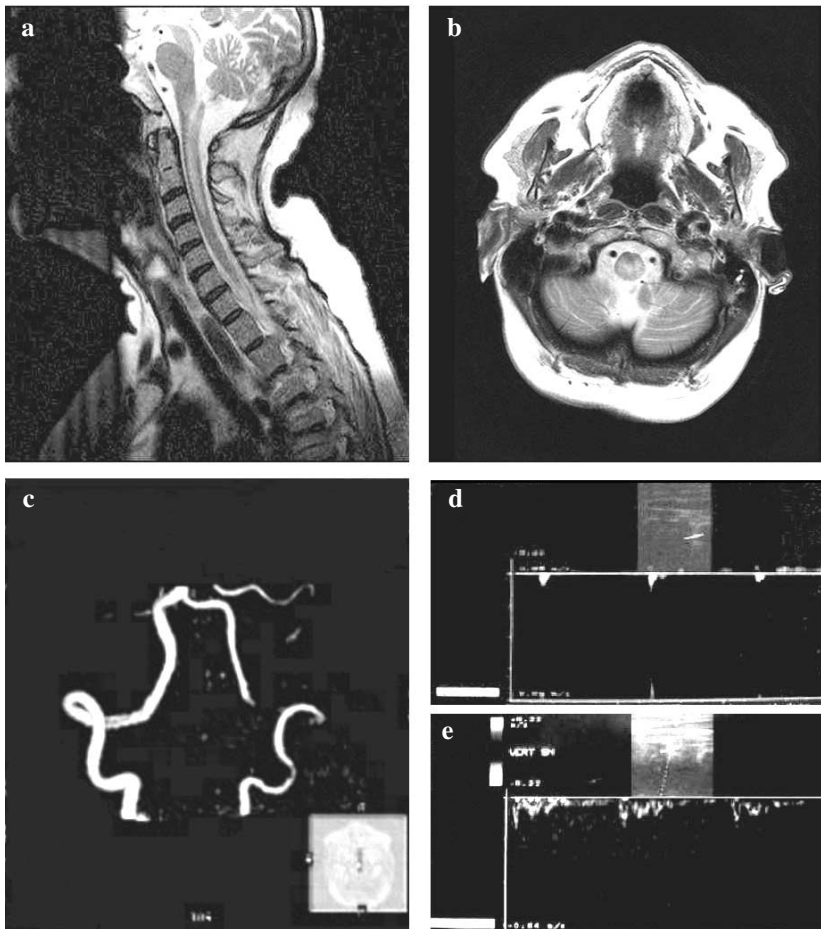


Fig. 1a,b MRI (GE-Philips 3 T): sagittal (a) and axial (b) T2-weighted images showed an infarct in the bilateral posterior lower medulla oblongata extending to the cervical cord until C4 level. (c) MR 3D TOF executed at admission showed absence of segment V3 of the left VA. **d,e** The admission Doppler ultrasounds showed an abnormal, only systolic, flow signal in the left VA (d), and normal flow in the right VA. The control Doppler ultrasounds showed an increased flow signal in the left VA, with the presence of the diastolic component (e)

limbs ataxia with severe loss of vibration and movement and position sense, mainly on the left side. Light touch and pinprick were normal. The patient's routine blood examinations, chest X-ray, ECG, transthoracic echocardiography and admission brain CT were normal.

Cervical cord and brain MRI showed a bilateral infarction prevalent on the left side, extending from the low posterior medulla oblongata to the cervical cord, including C4 level (Fig. 1a, b). The lesion was hyperintense in the long RT sequences, showing gadolinium enhancement of the medullar portion. On diffusion images a slight hypersignal in the posterior medulla oblongata was detected. A Doppler ultrasound showed a systolic flow signal in the left vertebral artery (VA), and normal flow in the right VA (Fig. 1d). MR angiography (MRA) showed a left hypoplastic VA with lack of visualisation of the third (V3) segment (Fig. 1c).

Coagulation, autoimmunity and infectious tests were normal. Lymphoma and monoclonal component were excluded. Cerebrospinal fluid standard analysis was normal.

The patient was treated with low-molecular-weight heparin and neurological symptoms gradually improved. Twenty days after, a control MRI showed a decrease of the cervico-medullary lesion. MRA showed recanalisation of V3 segment of the left VA, and the Doppler ultrasounds an

increased flow signal in the left VA, with the presence of the diastolic component (Fig. 1e).

Urinary retention resolved during the first three weeks, and she was able to walk independently 40 days after onset. A 3-month MRI showed a further reduction of the cervico-medullary lesion and the Doppler ultrasound confirmed a normal flow signal in V2 in the left VA.

Discussion

Due to heterogeneous causal factors, bilateral medullary and cervical lesions often remain undiagnosed as 'acute myelopathies of unknown etiology' [9]. The differential diagnosis, in addition to vascular diseases, includes infections, systemic lupus erythematosus, granulomatous arteritis, neurosarcoidosis, neuro-Behçet and multiple sclerosis.

Because of a wide anastomotic vessel network, PSA stroke is extremely rare [10]. The reported causes include diabetes mellitus, and other vascular risk factors, syphilitic arteritis, intrathecal injection of phenol and plasmocytoma [7].

Regarding vertebral artery dissection (VAD), there are very few cases describing a bilateral posterior spinal cord

syndrome due to VAD [11], and there are no reports of combined bilateral medullary and cervical involvement.

In our case a post-traumatic VAD was suspected. Unfortunately, the patient underwent MR angiogram but not conventional angiogram, and the typical subintimal haematoma and characteristic double lumen signs were not detected. Therefore, a thrombo-embolic occlusion cannot be definitively ruled out in this aged woman, but the patient did not have common cerebrovascular diseases risk factors, echocardiography was normal and the antecedent cranial trauma encouraged the possibility of post-traumatic VAD.

Our case had a peculiar topography, involving the bilateral posterior medulla oblongata and cervical spine. Loss of proprioceptive sensibility of limbs and facial hypoaesthesia are the prominent clinical features of PSA syndrome. In fact, PSA supplies the posterior columns and horns, a border zone partially involving the corticospinal and anterolateral tracts, and at the higher cervical and lower medullary levels it supplies also the bulbospinal nucleus of the trigeminal nerve through an ascending branch. Consequently, the posterior medullary superficial arteries are branches of the PSA in the lower medulla oblongata, whereas they arise from the PICA in the upper medulla oblongata [12].

We postulate that left VA dissection could have led to the occlusion of the branching vessels of the VA for PSA. The paired PSAs arise from the distal VA at the side of the medulla oblongata, reinforced by a succession of small branches by means of which they continue to the lower spinal cord.

All these small vessels, together with anastomoses between ASA and PSAs, with advancing age may not adequately supply spinal cord circulation due to atherosclerosis. This can explain the bilateral extension of the reported medullary and cervical infarct.

The most suitable explanation for the bilateral involvement of medulla oblongata and cervical spine is that the dominant PSA originated from the hypoplastic left VA, in the region of the VAD, which gives tributaries to both sides of the posterior medulla oblongata and spinal cord.

In conclusion we report an unusual stroke extending from bilateral dorsal medulla oblongata to bilateral posterior cervical cord (bilateral PSA territories). The present case is peculiar for its topography and illustrates the importance of considering a vascular aetiology in the differential diagnosis of bilateral posterior cervical and medullary lesions.

Sommario *Gli ictus midollari sono generalmente localizzati nel territorio dell'arteria spinale anteriore, mentre un coinvolgimento delle arterie spinali posteriori è meno frequente ed è in genere monolaterale. Eventi ischemici nel territorio di entrambe le arterie spinali posteriori sono estremamente rari. Descriviamo il caso di una donna di 70*

anni giunta alla nostra osservazione dopo un lieve trauma cranico, per la comparsa di dolore cervicale, atassia sensitiva ed ipoestesia all'emisoma sinistro, con successiva estensione all'emisoma controlaterale, volto incluso. Tra gli accertamenti eseguiti l'Eco-Color-Doppler ha mostrato un segnale olosistolico nell'arteria vertebrale sinistra e la RMN encefalo e cervicale ha evidenziato una lesione ischemica bilaterale estesa dal bulbo in sede posteriore fino a C4 con ipoplasia dell'arteria vertebrale sinistra e mancata visualizzazione del tratto V3. La particolarità di questo caso consiste nella presenza di un ictus localizzato nel territorio di entrambe le arterie spinali posteriori, verosimilmente dovuto a dissecazione dell'arteria vertebrale sinistra, in presenza di una arteria spinale posteriore dominante avente origine dall'arteria vertebrale sinistra ipoplasica.

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