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Avellis syndrome due to borreliosis

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Abstract

Avellis syndrome is a rare form of alternating hemiparesis that is usually due to atherosclerosis. We report a 67-year-old man who developed paresthesiae of the left arm, dysphagia and dysphonia. The clinical picture, MRI and CSF findings were consistent with Avellis syndrome caused by brain stem arteritis due to late stage *Borrelia burgdorferi* infection, an extremely unusual etiology for Avellis syndrome; this may well be the first such instance. It may be unrecognized in elderly patients with other risk factors for cerebrovascular disease.

Key words: Neuroborreliosis, stroke, vasculitis

Introduction

Avellis syndrome is a rare neurological disorder characterized by paralysis of the soft palate and vocal cord on one side, and loss of pain and temperature sensation of the extremities, trunk and neck contralaterally. In most of the published cases, the cause of the syndrome was atherothrombosis of branches of the distal vertebral artery [1, 2] We report the first case of Avellis syndrome caused by brain stem arteritis due to neuroborreliosis.

Case Report

A 67-year-old Caucasian man complained of paresthesiae of the left arm, swallowing difficulty and hoarseness that had suddenly developed the previous day. His family physician ascribed the symptoms to a sore throat and prescribed amoxicillin. However, the dysphagia; worsened so that he was unable to swallow his medication and he was referred to our hospital. On admission he mentioned that five months ago, after a weekend spent in his vineyard, he noticed a red macule on his chest, which spread over the next few days, resembling *erythema migrans*; this was followed by a left peripheral facial palsy. He did not remember a tick bite. His serum *Borrelia burgdorferi* IgG titre was elevated at that time (243.4 RU/mL, ELISA) and he was successfully treated with doxycycline.

The admission neurological examination revealed a right Horner syndrome and a subtle right facial asymmetry; the throat showed no signs of infection, but the right palate was completely paralyzed and did not elevate on phonation, the right gag reflex was reduced. Pain and temperature sensations were diminished on the left extremities but the face was spared. Blood pressure was 160/70 mm Hg and body temperature was normal. There were no bruits over the carotid arteries; the cardiac examination was normal. Initial laboratory data included a normal red blood count, elevated erythrocyte sedimentation rate (49 mm/h; normal range 2-13), elevated C-reactive protein (72 mg/l; normal value <5) and elevated leukocyte count

($11.5 \times 10^9/L$) with a normal differential. Blood glucose, urea, creatinine, liver function tests and electrolytes were normal except for a slightly low potassium level. He had normal cholesterol and triglyceride levels and normal coagulation parameters except for fibrinogen which was elevated (7.0 g/L; normal range 1.8-4.1). Brain computed tomography (CT) scan was normal and Doppler ultrasound revealed a greatly reduced flow through the right vertebral artery.

Because of the positive past history for *Borrelia burgdorferi* infection, the cerebrospinal fluid (CSF) was examined: the cell count was 6/3, of which 3 cells were phagocytes; the protein content was normal (0.27 g/L; normal range 0.17-0.37), and so were glucose and lactate levels; 10 oligoclonal bands (OCB) were present and the borreliosis IgG index was 44.9 with positive IgG on both ELISA and Western blot. CSF was not cultured for *Borrelia*. Flair magnetic resonance imaging (MRI) of the brain revealed a band-shaped focus of FLAIR) signal in the right medulla oblongata (Figure 1A and B); the rest of the brain showed no signs of vascular lesions. MR angiography showed no signs of vertebral artery dissection (Figure 2). A 21-day course of ceftriaxone (2 mg per day) was initiated, resulting in excellent recovery.

Discussion

The patient's symptoms reflected involvement of the medulla oblongata and were consistent with Avellis syndrome. Right-sided pharyngeal palsy indicated involvement of the *nucleus ambiguus*, Horner syndrome was consistent with involvement of the descending sympathetic tract, and the left-sided (contralateral) temperature and pain sensation loss resulted from a lesion of the lateral spinothalamic tract. Based on the clinical presentation and the MRI lesion in the rostral portion of the medulla, we postulated pathological involvement of the long perforating arteries arising from the vertebral artery. Although the most common cause of

medullary stroke is atherosclerosis[3], small arterial vasculitis can also account these pathological changes. The patient's past history of *Borrelia* infection led to the positive search of *Borrelia burgdorferi* antibodies in the CSF.

The neurological manifestations of the late phase of Lyme disease may include chronic encephalomyelitis, Lyme encephalopathy or rarely vasculitis and cerebral infarction [4]. The diagnostic *sine qua non* for the diagnosis of neuroborreliosis is either demonstration of *Borrelia burgdorferi* in CSF culture, or of the intrathecal synthesis of *Borrelia burgdorferi* antibodies by at least two methods in the same sample [4, 5]. Our patient had both early and chronic manifestations of neuroborreliosis, and the diagnosis was confirmed by CSF antibodies detected with ELISA and Western blot. The absence of CSF pleocytosis and elevated CSF protein level in our patient is not unusual in chronic Lyme disease of the nervous system and should not deter from considering neuroborreliosis in the differential diagnosis when appropriate [6]. The suggestion that an immune process may play a crucial role in the pathogenesis of vasculitis [7] is supported by the finding of cross reacting antibodies directed against neuronal proteins, and by the fact that the peripheral neuropathy in Lyme disease occurs on the basis of small vessel vasculitis in the absence of detectable infectious agent [8].

There are very few published reports on vasculitis or stroke as the presenting symptoms of neuroborreliosis (Table 1), and most of them have occurred in children and adolescents.[9-13]. Romi et al.[14] described a 56-year-old patient who developed right-sided hemiparesis and bilateral facial palsy. His CSF revealed pleocytosis and elevated protein levels with MRI demonstration of several foci of vasculitic lesions. Another report clearly illustrates how other manifestations of neuroborreliosis, such as peripheral neuropathy, can lead to the accurate diagnosis of stroke as a late manifestation of this disease, despite the lack of characteristic CSF changes [15].

Brain stem arteritis due to neuroborreliosis is an extremely rare cause of Avellis syndrome and may be unrecognized in elderly patients with the more common risk factors for cerebrovascular disease, but a careful medical history and detailed neurological examination can lead to a correct diagnosis and appropriate treatment.

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Figures

Figure 1. Brain MRI, FLAIR sequences: (A) transverse section at the level of medulla oblongata showing high signal intensity in the right rostral portion; (B) coronal section showing high signal intensity in the right lateral medulla oblongata.

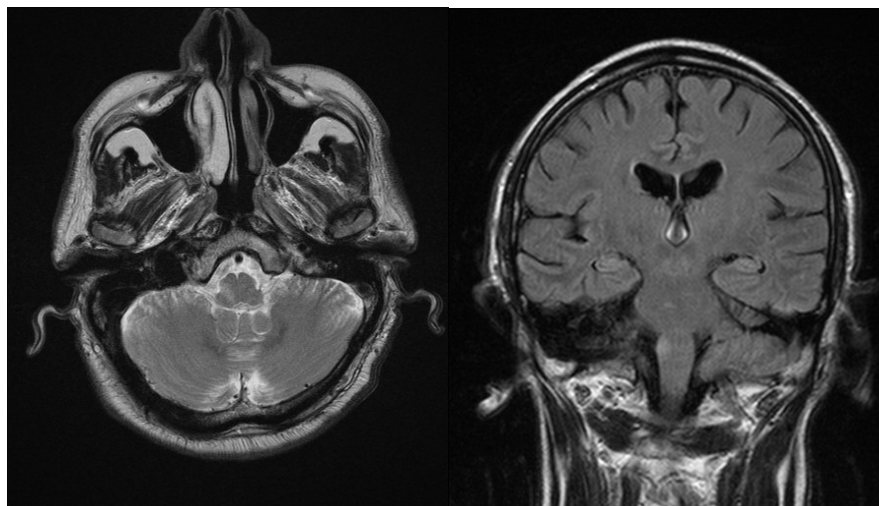


Figure 2. Brain MR angiography showing absent A1 segment of the anterior cerebral artery, as well as multiple irregularities in the walls of the arteries.



Tables

Table 1. Previously reported cases of stroke due to borreliosis.

No.	Gender	Age	Tick bite	Symptoms	CSF cells	OCB	CSF borrelia antibody index	Country of origin	Reference
1.	M	17	NO	Left arm weakness and left-sided facial palsy	72	U	IgM 8.1 / IgG 9.69	Germany	Heinrich et al.[9]
2.	F	15	YES	Right-sided hemiparesis	64×10^6	U	IgM 4.2 / IgG 14.7	Germany	Willke et al. [10]
3.	M	5	YES	Left-sided hemiparesis and blurred speech	5×10^6	U	Negative	Germany	Willke et al. [10]
4.	F	9	NO	Right-sided hemiparesis and speaking difficulties	14×10^6	YES 14	IgM 1.4 / IgG 12.9	The Netherlands	Cox et al. [11]
5.	F	12	NO	Right-sided hemiparesis	45	YES 11	IgG 8.1	Germany	Klingebiel et al. [12]
6.	M	20	NO	Left-sided hemiparesis	1500	YES 6	IgG 13	Germany	Keil et al. [13]
7.	M	56	NO	Right-sided hemiparesis and bilateral facial palsy	250	YES 10	IgM 0.5 / IgG 2.5	Norway	Romi et al. [14]
8.	M	74	NO	Left-sided hemiparesis	U	U	Serum positive	USA	Zhang et al. [15]

M – male; F – female; U – unavailable; OCB – oligoclonal bands; CSF – cerebrospinal fluid