Case Reports

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Cerebral Vasculitis with Multiple Infarcts Caused by Lyme Disease

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Introduction

Lyme disease is caused by *Borrelia burgdorferi* and is usually transmitted by the bite of an infected tick *(Ixodes ricinus).* It represents the most common vector-borne illness in Europe. Expanding annular rash (erythema migrans), myalgia, arthralgia, arthritis and neurological symptoms such as facial palsy and lymphocytic meningoradiculitis are typical symptoms. In about 10–15% of patients the peripheral or central nervous system is involved [1, 2]. We describe a patient with cerebral ischemia caused by cerebral vasculitis, a rare and atypical manifestation of the disease.

Case Report

A 38-year-old woman was referred to hospital with acute onset of an incomplete left-sided hemiparesis. She had a history of alcohol abuse, consuming approximately 4 bottles of beer per day, and had suffered an episode of alcoholic psychosis that required hospitalization in 1996. Additionally, an essential hypertension was known. Four months before admission, the patient complained of increasing headache, dorsalgia and neck pain after picking mushrooms in woodland. Following the trip, she noticed nearly 20 ticks spread all over the body, which were removed by a general practitioner the next day. On questioning, the patient could not recall having a rash at the time. Because of the persistent headache and neck stiffness, she presented for repetitive consultations to different doctors and got symptomatic treatment. A few days before admission, she developed increasing nausea, vomiting and weakness.

On admission the patient was somnolent, disorientated and suffered from hallucinations. She had neck stiffness, slight dysarthria caused by a left-side facial palsy, an incomplete hemiparesis with enhanced, very brisk reflexes and a positive plantar reflex on the left. The first CT showed the beginnings of an infarction of the right lentiform nucleus and internal capsule. Investigation of standard hematological and biochemical parameters revealed leucocytosis (10.4 GPt/l) and elevated hepatic parameters, but C-reactive protein was normal.

Magnetic resonance imaging performed the next day verified infarctions of the right basal ganglia and the temporal cortex (fig. 1) and showed meningobasal enhancement of both hemispheres temporally and frontally. The MRA detected a high-grade stenosis of the right internal carotid artery (ICA) with subsequent reduced flow in

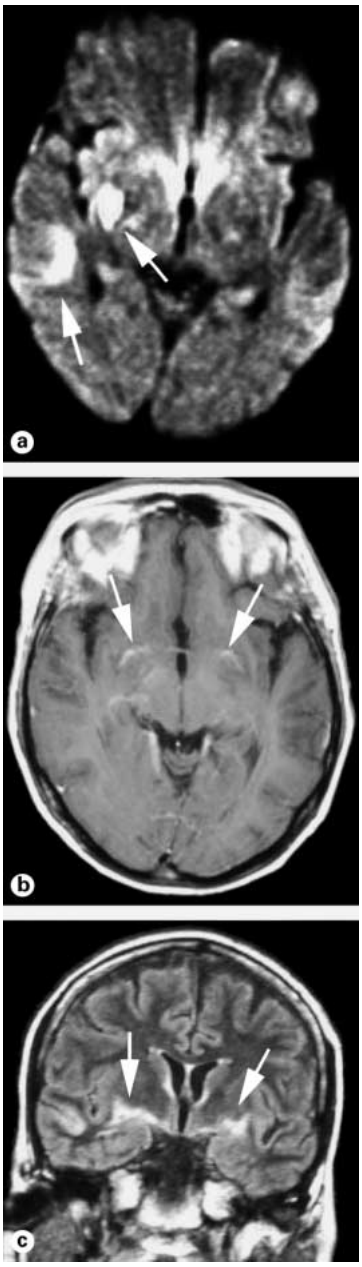

Fig. 1. MRI of January 4th, 2001. Areas of disturbed diffusion in the right temporal lobe and lentiform nucleus can be seen (arrows, **a**); contrast enhancement (arrows) of the anterior commissure and basal ganglia of both hemispheres (**b**), and an increased signal (arrows) of this region on FLAIR images (**c**) are clearly visible.

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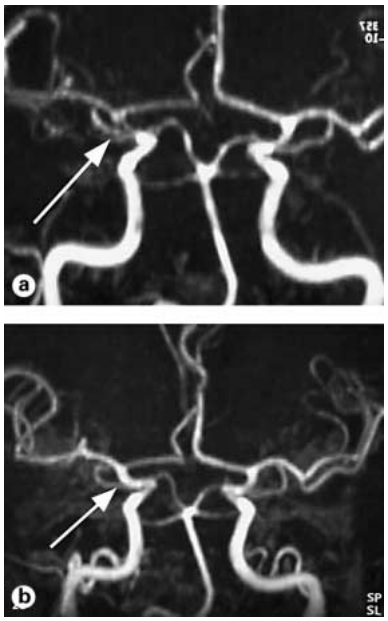

Fig. 2. The MRA of January 4th, 2001, detected a high-grade stenosis of the C5 portion of the right ICA (arrow) with subsequent reduced flow in the right M1- and A1-segments (**a**). On June 19th, 2001, the blood flow in the right ICA had recovered (**b**).

the right M1- and A1-segments (fig. 2). Transcranial Doppler showed increased blood flow velocities in the middle and anterior cerebral arteries, on the right more than on the left. Cerebrospinal fluid (CSF) was xanthochrome with a lymphocytic pleocytosis (298 MPt/l), elevated liquor protein (7,458 mg/l) and lactate (6.07 mmol/l) and a decreased glucose level (1.88 mmol/l). Lymphocytic pleocytosis in CSF is highly indicative for Lyme disease, thus detection of specific antibodies against *B. burgdorferi* was performed. Strongly raised IgM and IgG antibodies specific against *B. burgdorferi* were demonstrated by enzyme immunoassay (EIA) in serum and CSF. The specific CSF/serum antibody index was 8.6 for IgG and 541 for IgM (normal <1.5), implying an intrathecal synthesis of borrelial-specific immunoglobulin M and G, which was verified in the immunoblot (IEF). We made the diagnosis of a borrelial-induced meningitis with subsequent vasculitis and infarction. A transesophageal echocardiogram revealed no abnormalities.

In the first hours after submission the patient deteriorated under the initial anticoagulant treatment of a weight-adjusted dose of low-molecular-weight heparin (nadroparin) and a supplementary antiviral therapy with aciclovir. At the beginning of the parenteral treatment with ceftriaxone (3×2 g/day over 21 days) and urbasone (250 mg/day), she had fever, tachycardia and dysphagia. The left side was hemiplegic with spastic tonus.

Immediately after initiation of antibiotic therapy the patient improved rapidly. Disorientation, headache and neck stiffness completely regressed, the hemiparesis and the clinical parameters likewise improved. CSF after 3 weeks of treatment showed 112 MPt/l leukocytes, protein of 1,118 mg/l, lactate of 2.55 mmol/l, and a glucose level of 2.18 mmol/l. Transcranial Doppler detected still increased blood flow velocities in both middle cerebral arteries. The meningeal contrast enhancement declined on MRI.

Six months later a slight spastic left-sided hemiparesis still remained. MRI showed one residual ischemic lesion in the right lentiform nucleus, but no pathological enhancement (fig. 2b). Transcranial Doppler of the cerebral vessels was normal. Liquor antibodies were still elevated (specific CSF/serum antibody index was 5.97 for IgG and 2.69 for IgM, normal <1.5), but the general liquor parameters such as leukocytes, protein, lactate and glucose were normal.

Discussion

Although vasculitis of small vessels has been postulated as the mechanism of injury, particularly of the peripheral nervous system in Lyme disease, cerebral infarction seldom occurs and may go undetected in some patients without meningitis. Generally, cerebral vasculitis caused by *B. burgdorferi* shows an involvement of small vessels, mainly in vertebrobasilar arteries supplying the thalamus [3–6]. In the brain, histopathological findings include perivascular lymphocytic infiltration similar to changes described for the peripheral nervous system. In some cases the presence of spirochetes in tissue sections could be shown [7, 8], suggesting that a direct inflammatory response to invasion by *B. burgdorferi* seems to be the primary pathogenic mechanism of vasculitis in Lyme disease. This theory is supported by the fact that antibiotics have been therapeutically effective in acute and chronic forms of the disease. However, the involvement of the middle cerebral artery territory with basal ganglia infarctions – as shown in our patient – is unusual [6, 9]. In view of the excellent prognosis for patients with Lyme disease if treated properly with antibiotics [10] and the widespread occurrence of the disease, cerebral Lyme vasculitis should be considered a differential diagnosis for patients with cerebral infarction without cardiovascular risk factors. If there are clinical signs or an anamnesis suggesting Lyme disease, a lumbar puncture and, in case of lymphocytic pleocytosis in CSF, detection of specific antibodies against *B. burgdorferi* should be performed.

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Wegener's Granulomatosis Presenting with Intracerebral Hemorrhages

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Introduction

Wegener's granulomatosis is a disease of unknown causes, usually affecting adults and predominating in males with a ratio of 2:1. The main features are subacutely evolving necrotizing granulomata of the upper and lower respiratory tracts, followed by necrotizing glomerulonephritis and systemic vasculitis [1].

Approximately 50% of patients with Wegener's granulomatosis experience neurological manifestations at some point during the course of their disease [2–5]. The most frequent neurological involvement is peripheral neuropathy in the form of symmetrical or asymmetrical polyneuropathy, mononeuropathy multiplex or multiple cranial neuropathies.

The basilar parts of the skull may be eroded, with spread of granuloma to the cranial cavity and more remote parts; the orbita are involved in 20% of patients.

Wegener's granulomatosis may also cause (though rarely) intracranial complication in the absence of nasal or renal disease and without cerebral angiographic abnormalities.

Cerebral involvement in Wegener's granulomatosis is a rare complication that can arise at any time during the course of the disease and at any place in the brain, leading to a variety of neurological symptoms.

We report a case of undiagnosed Wegener's granulomatosis presenting with subarachnoid hemorrhage and multiple intracerebral hemorrhages from preexisting granulomata after i.v. anticoagulation for myocardial infarction.

Case Report

The patient, a 78-year-old woman, was admitted to our hospital because of progressive dyspnea during exercise and fever; chest X-ray showed pulmonary infiltrates in the left upper lobe. Three days after admission the patient was transferred to the cardiological department because of sudden-onset precordial pain. Anterior myocardial infarction was diagnosed because of raised MB-CK levels and ST-segment increase with loss of R-waves in leads V1, V2, V3 on the electrocardiogram. Intravenous heparin was given. The patient subsequently developed headache of increasing intensity with vomiting, drowsiness, confusion, dysphasia and right hemiparesis. A quick worsening occurred in the following hours and an extensive neurological injury became apparent: tetraparesis, focal seizures and coma. An unenhanced brain CT was performed showing subarachnoid hemorrhage and multiple separate areas (n = 8) of hemorrhagic infarction in both hemispheres in the shape of 'pseudocystic' lesions, predominantly in the left frontal lobe (3 lesions; fig. 1). A fluid-fluid level was seen within the large preexisting granulamatous cavities. The hyperdense dependent portion represents acute hemorrhage into a preexisting granulomatous cavity.

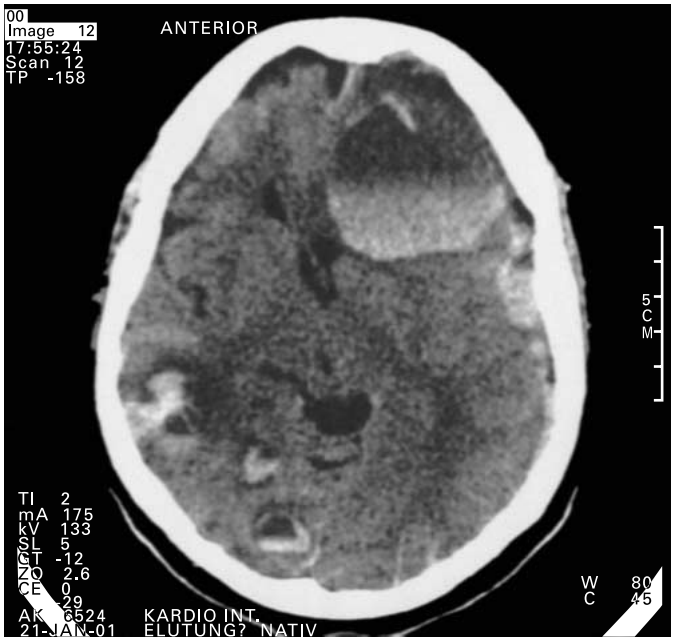

Fig. 1. Unenhanced brain CT showing subarachnoid hemorrhage and multiple separate areas (n = 8) of hemorrhagic infarction in both hemispheres in the shape of 'pseudocystic' lesions, predominantly in the left frontal lobe (3 lesions). A fluid-fluid level was seen within the large granulamatous cavities. The hyperdense dependent portion represents acute hemorrhage. Although low fluid levels may be transiently encountered in spontaneous hematoma, such a finding generally indicates hemorrhage into a preexisting cavity.

Medical history was remarkable for chronic obstructive pulmonary disease and many episodes of sinusitis and epistaxis. She had no history of any neurological illness.

Antineutrophil cytoplasmic autoantibody (ANCA)-testing by indirect immunofluorescence was positive (c-ANCA, 1:128) with anti-proteinase-3 antibodies positive.

The patient died 20 h after occurrence of the neurological symptoms. The diagnosis of Wegener's granulomatosis was made on autopsy. In the lungs a left-sided bronchopneumonia and small peripheral emboli were found. Microscopic findings included infiltration containing granulocytes, extensive hemorrhage and intramural thrombosis. Giant cells were also present, but there were no granulomata. A nonspecific chronic inflammation of the nasal septum was found. Histological analysis of the spleen showed widespread necrotizing vasculitis. Nongranulomatous necrotizing vasculitis in