

Course of Cerebral Lesions in a Patient with Periarteritis Nodosa Studied by Magnetic Resonance Imaging

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Summary. The course is reported of a patient with periarteritis nodosa who initially presented with neurological symptoms. Multiple cerebral lesions were documented by the first magnetic resonance imaging (MRI) investigation. The majority of these had disappeared completely in the follow-up MRI studies. In contrast to neurological improvement the patient eventually died due to multiorgan failure. Postmortem histological examination revealed no pathological findings in the brain except one single necrotic area already known from MRI. Remissions of histological and angiographic alterations in periarteritis nodosa have been described as "local healing" leading to fibrosis and scarring. Our findings suggest that *restitutio ad integrum* may occur, at least in cerebral lesions.

Key words: Periarteritis nodosa – Magnetic resonance imaging – Cerebral lesions

Periarteritis nodosa (PAN) is a progressive necrotizing vasculitis of small to medium-sized arteries. Multiple organ involvement with various clinical manifestations frequently presents a diagnostic challenge. Diagnosis is established by skin or muscle biopsy or visceral angiography demonstrating aneurysm formation at the sites of involvement. The incidence of hepatitis B antigen in PAN is 11%–54% [1, 4, 5–7]. In spite of early treatment the prognosis of the disease is poor [3, 5, 8, 11]. Spontaneous or therapy-induced remission of histological and angiographical manifestations occur without any correlation with the clinical course

Abbreviations: PAN=panarteritis nodosa; MRI=magnetic resonance imaging; CT=computerized tomography; CNS=central nervous system

[2, 5, 11, 13]. The disease is associated with neurological symptoms in 80% of cases, and central nervous system involvement takes place in about 40%.

We report a patient with PAN, who developed neurological symptoms early in the course of the disease. Alterations in the central nervous system (CNS) were documented by magnetic resonance imaging (MRI) and followed up during a progressive and finally fatal course.

Case Report

A 35-year-old man was admitted with a weight loss of 30 kg within 5 months, abdominal pain, subfebrile temperature, and positive HBs Ag, HBe Ag, and antiHBc. On examination he appeared slightly depressed and showed mild signs of peripheral neuropathy; arterial blood pressure was 210/140 mmHg. Erythrocyte sedimentation rate (ESR) was 100/130, fibrinogen level was 940 mg/dl, and the white blood cell count was 13 G/l; there was an elevation of IgA (498 mg/dl) and IgG (2031 mg/dl), whereas IgM was normal; BUN, creatinine, and creatinine-clearance (109 ml/min) were within normal range. Circulating immune complexes were present.

The patient developed acute radicular symptoms of the right lower and the left upper extremity as well as visual disturbance in both eyes with bilateral papilledema. Results of computerized tomography (CT) of the brain and the spinal cord were normal; there were no signs of cerebral edema. Lumbar puncture revealed no evidence of bacterial or viral infection. A few days later the patient experienced grand mal seizures on two occasions with residual right hemiparesis. CT now demonstrated diffuse cerebral edema. MRI (Philips Gyroscan, 0.5 T superconducting system) showed multiple ex-

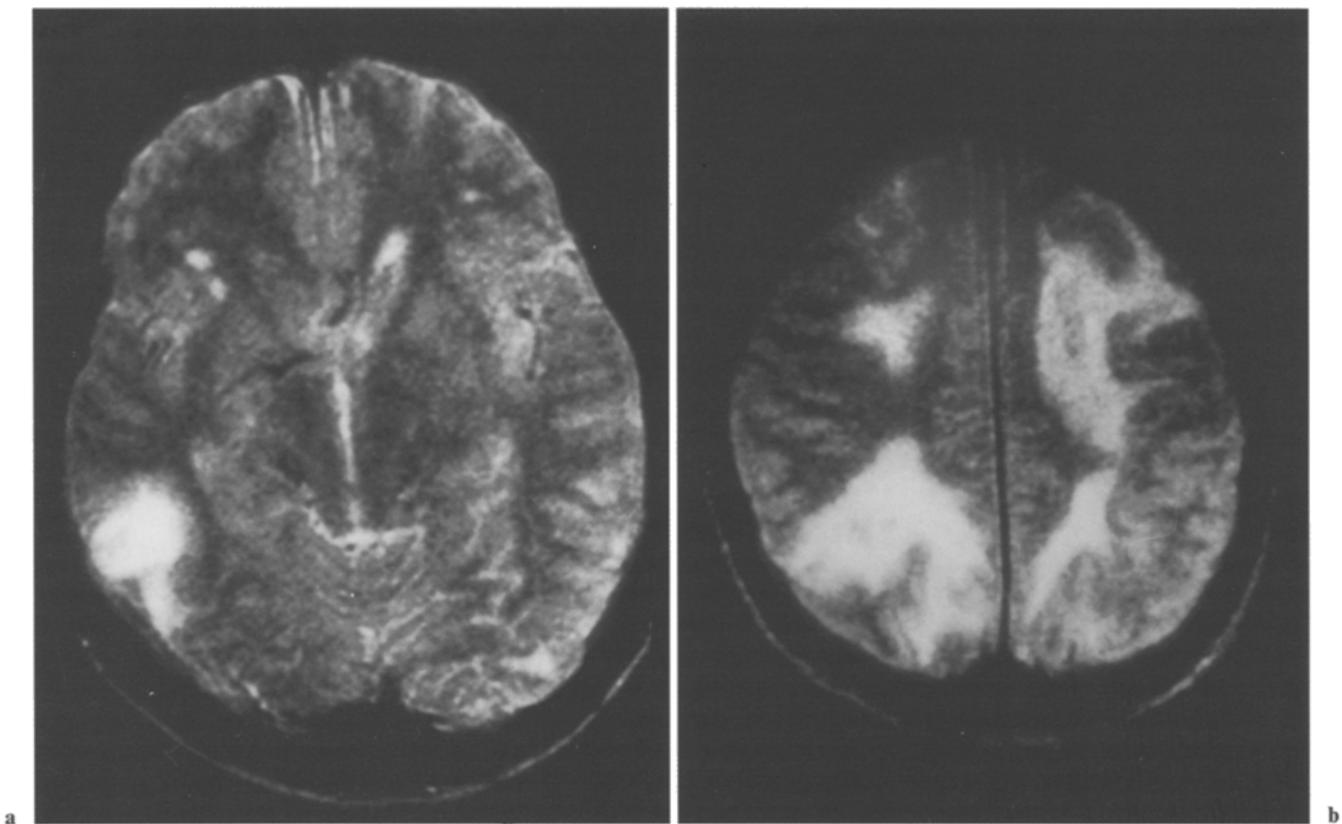


Fig. 1a, b. Transaxial magnetic resonance image (spin echo, 2000/100): multiple focal hyperintense areas at the junction of gray and white matter in the deep white matter (a) and at the level of the centrum semiovale (b)

tensive lesions in both hemispheres situated at the border of gray and white cerebral matter with predominant localization in the white substance (Fig. 1 a, b). After administration of hydrocortisone and antiepileptic therapy the patient had no additional seizures, and the right hemiparesis disappeared completely within the following 3 weeks. The second MRI (3 weeks after the first investigation) disclosed a decrease of the lesions in the white substance (Fig. 2). BUN rose to 32 mg/dl, creatinine to 1.7 mg/dl, and creatinine-clearance dropped to 44 ml/min.

Based on the clinical symptoms and laboratory findings a diagnosis of PAN was suspected. A renal arteriography employing the digital subtraction angiography technique was made, demonstrating multiple intrarenal aneurysms, as well as stenoses and occlusions in small and medium-sized arteries, thus establishing the diagnosis of PAN. At that time (about 4 weeks after the initial neurological symptoms) therapy was started with prednisolone (1 mg/kg) and cyclophosphamide (0.8 mg/kg, after 2 weeks 1.6 mg/kg). The patient remained in stable condition for about 1 month.

Four weeks later he was readmitted with signs

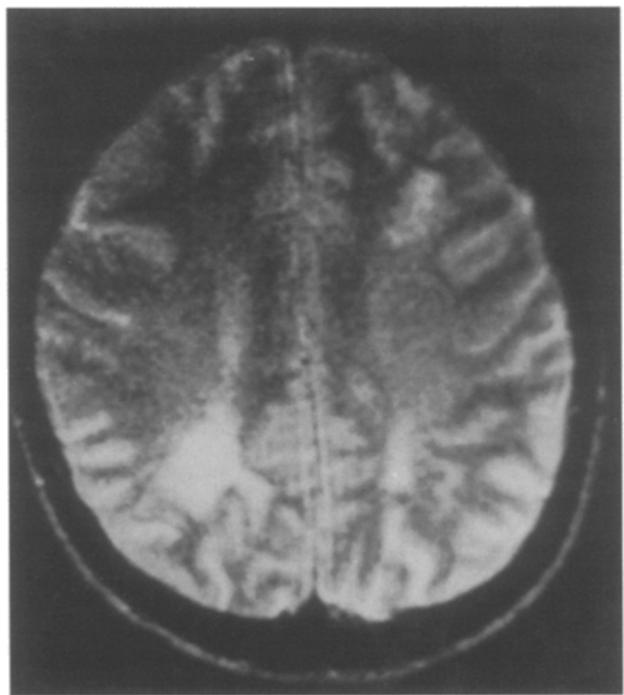


Fig. 2. Follow up MRI investigation (spin echo, 2000/100) 3 weeks later indicates reduction of size and number of high-signal areas at the level of the centrum semiovale

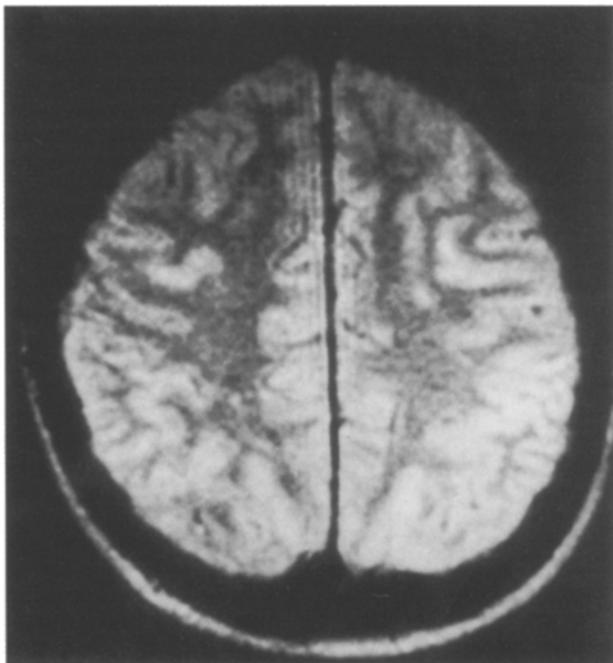


Fig. 3. Twelve weeks after the first study follow-up MRI investigation (spin echo, 2000/100) reveals complete remission of altered areas around the centrum semiovale except one area at the right parietal region

of congestive heart failure and worsening renal function (creatinine, 4.0 mg/dl). On neurological examination there was now only discrete peripheral neuropathy. The third MRI (12 weeks after initial MRI investigation) showed a complete disappearance of the cerebral lesions, except in one area situated in the right parietal lobe (Fig. 3).

During the ensuing 3 months the course of the disease was characterized by a rapid deterioration of cardiac, renal, and pulmonary functions; finally, 7 months after the onset of the symptoms, the patient had to be transferred to the intensive care unit due to multiorgan failure. In the fourth MRI (6 months after the first MRI investigation) no changes in comparison with the third investigation (3 months before) could be found. Repeated plasmapheresis with confirmed removal of circulating HBs Ag containing immune complexes had no influence on the progressive course. The patient eventually died in septic shock.

On autopsy involvement of the heart, lung, and kidneys was verified histologically. Extensive lesions were found especially in coronary and renal vessels. The brain appeared completely normal on macroscopic examination. Exact histological examination in serial slices of the areas initially presenting as hyperintense lesions and disappearing on follow-up MRI studies revealed no signs of

histologically active disease in the CNS. Only one small periventricular necrosis was detected in the right parietal lobe, corresponding to the last MRI finding.

Discussion

In PAN neurological symptoms frequently constitute the first manifestation of disease [1, 4]. Irritation of peripheral nerves followed by central nervous symptoms are repeatedly reported [1, 2, 4, 10]. At the time of his most serious CNS attack the patient had only signs of diffuse cerebral edema on CT, whereas MRI demonstrated multiple lesions at the junction of white and gray matter. These lesions showed increased signal intensity which is a nonspecific finding and can be seen in edema as well as in cellular infiltration or extravasation. Hyperintense lesions are reported in multiple sclerosis, vascular disorders [9], and malignant diseases. In our patient MRI documented the restitution of the majority of these lesions over a period of 3 months corresponding to a complete remission of the central nervous symptoms. The remission cannot be attributed to the drug therapy which was only started after the second MRI investigation. Postmortem histological examination of the brain revealed no pathological findings in the initially affected areas. The only lesion which persisted in MRI during the course of the disease was verified as a necrotic area on autopsy.

Remissions of histological and angiographic alterations during the course of PAN are well documented for muscle and kidney [2, 5, 12]. Authors widely agree that those remissions only represent a "local healing" according to the segmental character of the disease, but do not indicate a restoration of preexisting structure and function, so that the clinical course is nevertheless usually fatal [11, 12].

In our patient different cerebral lesions had a different course: the majority were not demonstrable on postmortem histological examination, and only one lesion persisted as a necrotic area. These findings indicate that cerebral manifestations in PAN are potentially reversible; further studies are required to clarify the exact morphological substratum of these.

It is suggested that morphological changes in the central nervous system in PAN can be identified and monitored by MRI; especially in the presence of neurological symptoms at an early stage of the disease MRI should be considered. To enable comment on the eventual therapeutic consequences, further investigations are necessary.

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