Case report

Unihemispheric central nervous system vasculitis

Sikawat Thanaviratananich*, Bashar Katirji

Neurological Institute, University Hospitals Cleveland Medical Center, 11100 Euclid Ave, Cleveland, OH 44106, USA

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ABSTRACT

Patients with primary central nervous system vasculitis (PCNSV) usually manifest with multiple enhancing bilateral hemispheric lesions. We presented an extremely rare clinical course and follow-up of a patient with PCNSV affecting only a single (right) hemisphere. A 33-year-old previously healthy man presented with a left hand clonic seizure followed by a secondary generalized tonic-clonic seizure and dysarthria. MRI brain revealed multiple hyperintense lesions confined to only the right hemisphere with contrast enhancement, involving both white and grey matters. He was treated with a methylprednisolone for 5 days followed by prednisone for suspected acute disseminated encephalomyelitis without improvements. He was presented again with left-sided weakness, transient dysarthria and black objects in left visual field. MRI brain was unchanged. MR angiogram and conventional cerebral angiogram were normal. Autoimmune work-ups were all negative. A brain biopsy showed evidence of PCNSV. He was then successfully treated with intravenous cyclophosphamide followed by oral azathioprine. On a follow-up 3 years later, he remains asymptomatic on azathioprine and a repeat MRI showed all areas of enhancement were gone.

1. Introduction

Primary central nervous system vasculitis (PCNSV) is a rare, poorly understood neurological disorder and difficult-to-diagnose disease. The incidence is 2.4 cases per 1,000,000 person-years [1]. Most cases manifest with multiple enhancing bilateral hemispheric lesions. We describe the clinical course and follow up of a patient with PCNSV affecting only a single (right) hemisphere and review the literature on this very rare presentation.

2. Case

A 33-year-old man, who was in an excellent health, suddenly noticed twitching of his left hand followed by dysarthria, progressing to a generalized tonic-clonic seizure. Brain magnetic resonance imaging (MRI) with and without contrast revealed multiple hyperintense lesions on T2 involving the white matter as well as the cortex in the right hemisphere with contrast enhancement. There was no involvement of the left hemisphere, surrounding edema, or restriction on diffusion studies. He was treated with a 5-day course of methylprednisolone, followed by oral prednisone for suspected acute disseminated encephalomyelitis. Phenytoin was also initiated to control seizure. Three months later, he presented to our hospital with a 2-day history of left-sided weakness, transient dysarthria, and a transient black objects in his left visual field with associated frontal headache. A repeat MRI was unchanged from the previous MRI. MR angiogram and conventional cerebral angiogram were normal and did not show any evidence of vasculitis. Cerebrospinal fluid (CSF) analysis showed mild pleocytosis (9 white cells/μL (75% mononuclear cells, 25% lymphocytes), 4 red cells/μL with total protein of 57 mg/dL and glucose 64 mg/dL. Other CSF studies were normal, including, IgG index, IgG synthesis rate, oligoclonal bands and electrophoresis. Rheumatologic work ups were all negative (anti-SM, anti-RNP, anti-SSA, anti-SSB, anti-SCL70, anti-centromere, anti-chromatin, anti-DsDNA, anti-JO1, anti-Ribosomal P, ANCA, and anti-Citrulline). C-reactive protein and erythrocyte sedimentation rate (ESR) were within normal limit. Hepatitis B and C profiles were negative. He was readmitted few weeks later after developing multiple partial motor seizures. Phenytoin was switched to levetiracetam which controlled his seizures. MRI showed enlarging and new lesions restricted to the right hemisphere with enhancement following gadolinium (Fig. 1A, B). A brain biopsy was eventually performed and revealed perivascular lymphocytic infiltrates, consistent with primary angiitis of the central nervous system (CNS) (Fig. 2). After a brain biopsy confirmed a PCNSV, he was started on oral prednisone 60 mg daily and intravenous cyclophosphamide 500 mg/m² and received 6 monthly infusions. He improved clinically with no residual weakness or seizures. A repeat MRI of the brain after completion of the 6 month course of intravenous cyclophosphamide showed dramatic improvement and most of the right hemispheric lesions had disappeared. He was switched to oral azathioprine 150 mg daily and...
prednisone was tapered slowly and discontinued. A repeat MRI brain 6 months later showed a single residual enhancement, so azathioprine was increased to 200 mg daily. On a follow-up 3 years later, he remains asymptomatic on azathioprine 200 mg daily and levetiracetram 1500 mg twice a day and a repeat MRI (Fig. 1C, D) showed all areas of enhancement were gone.

3. Discussion

This case was extremely unusual and challenging diagnostically since the patient presented with multiple enhancing lesions, all of them remained confined to the right hemisphere. The initial diagnosis was challenging and the differential diagnosis included CNS lymphoma, multicentric glioma, multiple abscesses and Rasmussen encephalitis. The diagnosis was ultimately confirmed by brain biopsy and the patient responded very well to immuosuppressive therapy.

Calabrese and Mallek suggested the diagnostic criteria for diagnosing PCNSV which included the neurological deficits that cannot be explained by other etiologies and a cerebral angiography or central nervous system biopsy showing evidence of vasculitis [1,2]. A large cohort showed that the most common initial presentations are focal neurologic deficit and headache. Seizure is the first presentation in 16% in this series [1]. ESR (> 30 mm/h) may be uncommonly increased. CSF may show pleocytosis with white cells ranging from 0 to 535 cells/mL with median of 5 cells/mL, and elevated total protein concentration with median of 72 mg/dL. Cerebral angiography showed changes characteristic of vasculitis in 90%. Multiple-vessels abnormalities were abnormal in 93%. Although abnormalities on MRI brain are variable,
the most common finding is an infarction, which was found in 89%, most commonly multiple infarctions. CNS histopathology was positive in about 62%. The negative pathology could be from sampling errors, patchy natures of the lesions, or the affected vessels did not extend to the parenchymal surface or leptomeningeal tissues. The treatments of choice include long-term steroid or immunosuppressive therapy. The authors suggested that angiography and CNS pathology are complementary [1].

Upon a thorough literature review, we found only three cases of PCNSV with multifocal enhancing lesions confined to only one cerebral hemisphere similar to our case (Table 1). All were confirmed pathologically.

4. Conclusion

To summarize, we presented a clinical course and follow up of an extremely rare case of extensive multiple primary central nervous system vasculitic lesions confined to a single hemisphere, successfully treated with immunosuppressive therapy. The explanation of unihemispheric PCNSV is yet to be clear. We postulate that the right and left hemisphere in these patients might develop differently during embryo, and the vessel in one hemisphere might be more prone to be pathologic. We conclude that PCNSV may present with strictly unihemispheric multiple enhancing lesions.

Disclosure of conflicts of interest

Sikawat Thanaviratananich reports no disclosures. Bashar Katirji reports no disclosures.

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Contribution

Sikawat Thanaviratananich – wrote the manuscript.
Bashar Katirji – reviewed and edited the manuscript.
| Author/year | Age | Sex | Initial presentations | MRI | MRA | Conventional angiography | Biopsy | Treatment | Outcome |
|-------------|-----|-----|-----------------------|-----|-----|--------------------------|--------|-----------|---------|
| Panchal et al. [3] | 25 | Female | Sudden right frontal headache and left hemiparesis | Massive vasogenic edema throughout the right cerebral hemisphere with multifocal enhancing lesions confined to the right hemisphere | Not mentioned | Not mentioned | Chronic inflammatory changes, perivascular lymphocytic infiltration, necrosis, and infarction | Dexamethasone and cyclophosphamide | Symptoms improved after 3 weeks |
| Damasceno et al. [4] | 45 | Male | Generalized seizure, followed by right hemiparesis and expressive aphasia | Atrophy and multiple enhancing lesions in the left hemisphere | No initial MRA mentioned | Normal | Focal gliosis, small intraparenchymal arteries and arterioles with thickened walls and narrowed lumen; perivascular cuffing by lymphocytes and leptomeningeal lymphomononuclear infiltration, with few parenchymal inflammatory cells | Azathioprine | Unsuccessful |
| Salvarani et al. [5] | 20 | Female | Acute onset of headache, left hemiparesis, left focal motor seizures with secondary generalisation | Multiple enhancing lesions involving the right cerebral hemisphere | Normal | Normal | Lymphocytic vasculitis | 1. Prednisone 60 mg/day, 2. Prednisone 60 mg/day, + cyclophosphamide 150 mg/day 3. Prednisone 60 mg/day + mycophenolate mofetil 200 mg/day 4. Prednisone 60 mg/day + azathioprine 200 mg/day 5. Prednisone 60 mg/day + cyclophosphamide 750 mg/m squared/month | 1. Relapses when prednisone was discontinued 2. Had hemorrhagic cystitis 3. Had leukopenia 4. Multiple relapses 5. 6 months after the treatment, she was able to halve the prednisone dose without relapses |
| Our case | 33 | Male | Sudden onset of twitching of left hand and dysarthria, followed by a generalized tonic-clonic seizure | Multiple hyperintense lesions on T2 with enhancement throughout the right hemisphere without edema | Normal | Normal | Lymphocytic vasculitis involving small leptomeningeal and intracortical blood vessels | Prednisone 60 mg per day, cyclophosphamide IV 500 mg/m², followed by oral azathioprine 150 mg/day | Recovered |
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None.

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