Polyarteritis Nodosa-Type Vasculitis Isolated to the Central Nervous System: First Case Report of a Fulminant Primary CNS Vasculitis Variant

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Abstract

Primary angiitis of central nervous system (PACNS) is an inflammatory disease of the blood vessels restricted to the central nervous system (CNS). The histopathology is heterogeneous, but in the great majority of adult cases it is a segmental necrotizing granulomatous vasculitis with intramural giant cells (1, 2). Here we report a case of PACNS in which the dominant cell type was polymorphonuclear (PMN) cells.

Background

The natural history, patient demographics and disease course of PACNS are highly heterogeneous, and cerebral cortex, white matter, and spinal cord have all been involved. Aggressive cases with rapid progression to coma and death as well as indolent, chronic forms had both been described (3).

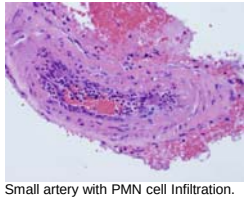
Considering the clinical heterogeneity, it is likely that PACNS covers a group of disease entities, not a single disease. Further contributing to the confusion is the lack of tissue diagnosis on some of the published series. While angiography was often used as the diagnostic method of choice because it carried a low procedural risk, it had been well documented that the sensitivity and specificity of angiography in the diagnosis of PACNS was variable at best (2, 7). Brain and meningeal biopsies remained the gold standard for the diagnosis of PACNS. It served to confirm the diagnosis and to exclude other conditions mimicking CNS vasculitis, which could be up to 39% of cases (8).

Case Descriptions

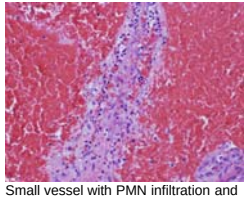
A 57 year-old woman was initially diagnosed at a community hospital with aseptic meningitis after presenting with headache, vertigo, and bilateral eye pain. Her lumbar puncture revealed 100 WBCs with 29% neutrophils, 66% lymphocytes and 40 RBCs. She was discharged on a 10 day oral dexamethasone taper, but the day after completing her taper she presented to our hospital with symptom exacerbation. On admission, CT head with and without contrast revealed a right occipital hyperdensity, leptomeningeal enhancement in the posterior parietal and occipital regions, a small right parietal subdural hematoma, and a left parietal-occipital subarachnoid hemorrhage. CT angiogram and venogram did not reveal any abnormalities. Lumbar puncture on day of admission to our hospital showed 2 WBCs, 1478 RBCs, 174 glucose, 40.3 mg/dl protein. Repeat CSF analysis the next day showed 0 WBCs, 7310 RBCs, 118 glucose and protein of 78.9 mg/dl. ANA, ACE, anti-cardiolipin, C-ANCA, P-ANCA, C3, C4, SS-A, SS-B, anti-Smith, anti-dsDNA, RF, and CCP IgG were negative. ESR was 25 (normal range 0-20) and hs-CRP was 0.286 (normal range 0-0.3). HIV, RPR, and hepatitis panel, as well as CSF VDRL, arbovirus panel, HSV PCR, CMV PCR and Lyme titers were negative. CSF was devoid of bacteria, viral, fungus, AFB, or malignancy. There was no evidence of pulmonary, renal, or gastrointestinal dysfunction.

The patient received empiric treatment for HSV encephalitis with acyclovir, TB meningitis with standard four-drug therapy, and CNS vasculitis with intravenous methylprednisolone 1 gram daily. On hospital day three the patient suddenly lost her vision despite a normal fundocscopic examination. MRI brain with and without contrast and MRI orbits with fat suppression on the same day revealed bilateral corona radiata ischemia, left subdural hematoma, bilateral parietal-occipital and posterior temporal leptomeningeal enhancement, and left parietal occipital subarachnoid hemorrhage. She received one dose of intravenous cyclophosphamide 750 mg/m2. A brain and meningeal biopsy were performed two days later. At surgery, the patient's blood vessels were hemorrhagic, and her arachnoid membrane was noticeably thickened, consistent with an inflammatory process. On hospital day 7, the patient became unresponsive and was intubated for airway protection. She had developed interval bilateral ACA-PCA watershed infarcts as well as bilateral ACA-MCA watershed and a left putamen infarct. The next morning she was dead by brain criteria, confirmed by a cerebral blood flow study.

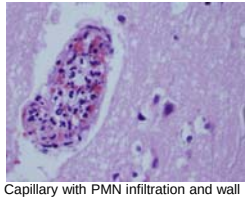
Pathology & Images



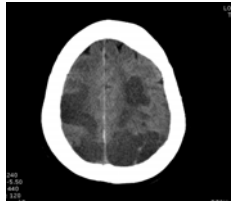
Small artery with PMN cell Infiltration.

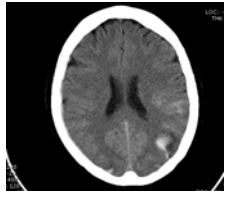


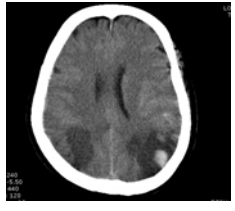
Small vessel with PMN infiltration and fibrinoid necrosis, which may have contributed to hemorrhage.



Capillary with PMN infiltration and wall thinning.
Note shrunken eosinophilic neuron in rarified neuropil, indicating ischemia.







CT without contrast demonstrated hemorrhagic and non-hemorrhagic infarcts and small subdural hematoma

Discussion

The typical histopathology of PACNS is transmural infiltration of inflammatory cells, primarily lymphocytes and mononuclear cells, and granuloma formation. In our case, the dominant cell type was polymorphonuclear cells. The caliber of vessels involved were small arteries, arterioles and capillaries with a polyarteritis nodosa pattern of inflammation. There was a complete absence of granulomatous inflammation of the vessels. CSF analysis revealed a mixed lymphocytic-polymorphonuclear pleocytosis and elevated protein levels, unlike typical PACNS with its purely lymphocytic pleiocytosis. (2,3).

The CNS can often be the fist site of insult in a systemic vasculitis. The lack of systemic signs or symptoms, the negative laboratory work-up, and the rapidly progressive nature of the disease in this patient make these diagnoses extremely unlikely.

Summary

To the best of our knowledge, this is the first reported case of isolated polymorphonuclear vasculitis of the CNS.

Our case report adds to the existing literature on the variable histopathology seen in PACNS and underlines the importance of tissue diagnosis in PACNS.

References

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