

MPO-ANCA Rapidly Progressive Glomerulonephritis with Immune Deposits

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INTRODUCTION

Antineutrophil cytoplasmic autoantibody associated (ANCA) vasculitides include a group of disorders that affect predominantly small-sized arteries. ANCA-associated conditions include granulomatosis with polyangiitis and microscopic polyangiitis.¹ These conditions typically present as focal necrotizing lesions without immune complex depositions on histology. There are two major categories of ANCA based on different autoantibody targets. Cytoplasmic ANCA (c-ANCA) refers to the diffuse cytoplasmic pattern of autoantibodies on immunofluorescence microscopy while perinuclear ANCA (p-ANCA) demonstrates perinuclear staining. Anti-proteinase 3 antibodies commonly are found in c-ANCAs while anti-myeloperoxidase is the major p-ANCA antibody. Induction therapy consists of steroids with either cyclophosphamide or rituximab. ANCA vasculitides classically demonstrate pauci-immune glomerulonephritis on microscopic examination, however, there were reported cases of immune complex deposition. This case report presents a patient with immune complex deposition and nephrotic range proteinuria.

CASE REPORT

A 40-year-old male with a past medical history of hypothyroidism and hypertension presented to the emergency department (ED) with complaints of headaches, weakness, and shortness of breath for seven days. The patient also reported back pain that worsened with deep inspirations.

Prior to arriving to the ED, the patient was evaluated at his primary care provider's office and was found to be hypertensive, so he was advised to go to the ED. The initial blood pressure in the ED was 189/109 mmHg; all other vital signs were normal. Initial labs were significant for a serum sodium of 130 mmol/L, creatinine of 2.84 mg/dL, and a white blood cell count of 12.5 k/cumm.

A chest radiograph was obtained for evaluation of his shortness of breath, which revealed faint bilateral interstitial opacities. A brain computed tomography demonstrated an old left lacunar infarct but was otherwise unremarkable.

On review of systems, the patient endorsed decreased food and fluid intake as well as bloody urine. Initial urinalysis, obtained in the ED, demonstrated 2+ protein, 3+ blood, and 2+ leukocyte esterase. Microscopic examination of the urine sample demonstrated 20-50 red blood cells per high power field (hpf), and 10-20 white blood cells per hpf. He was admitted to the intensive care unit for hypertensive emergency; however, his blood pressure was controlled by a single dose of hydralazine that was administered in the emergency department. The patient

was started on antibiotics for his presumed community acquired bacterial pneumonia.

Diagnostic work-up of his acute renal failure revealed normal kidneys bilaterally without hydronephrosis on renal sonogram, and a fractional excretion of sodium was calculated to be 3.1% suggesting intrinsic renal disease. The patient's renal failure was attributed to glomerulonephritis. Complement C3 and C4 levels were found to be normal. Nephrology was consulted and a renal biopsy with serology demonstrated diffuse necrotizing and crescentic glomerulonephritis with immune-complex deposition. Immunofluorescence demonstrated heavy IgM, C3 deposition. The patient was started on intravenous methylprednisolone.

Urine protein to creatinine ratio was calculated to be 7.5 which was in the nephrotic range. Serologies were remarkable for p-ANCA titer of 1:320 and anti-myeloperoxidase of 20:9 which was consistent with microscopic polyangiitis. All other serologies were negative. The patient was given an infusion of rituximab while admitted and discharged with oral prednisone with plans for an outpatient infusion of rituximab.

DISCUSSION

This patient presented with rapidly progressing glomerulonephritis and subsequently was diagnosed with microscopic polyangiitis, renal limited. Microscopic polyangiitis typically does not display immune complex deposition on immunofluorescence microscopy, however, immune complex deposition has been reported in a growing number of studies.²

Immune complex deposition, poor renal function (sCr > 3.62 mg/dL), sclerotic histopathology, low albumin (< 3 g/dL), low hemoglobin (9 g/dL), and persistently low serum C3 concentrations were associated with poor renal survival.^{3,4} This patient presented with immune complex deposition, poor renal function, and low albumin. However, he had a normal serum C3, non-sclerotic histology, and hemoglobin > 9 mg/dL.

CONCLUSIONS

The degree to which immune complex depositions can predict prognosis is an area for further research, but the presence of these complexes has been a positive prognostic indicator for glomerulonephritis. In two different studies, a greater number of immune complexes was associated with increased findings of proteinuria. This could make the percentage of immune complexes a significant predictor of renal outcomes.^{5,6} Additionally, these new findings change the way pauci-immune vasculitis could be classified in the future. Colloquially, the absence/minimal immune complex deposition places MPO in the "pauci" vasculitis group. However, this case report amongst previous studies provided a rationale for further research into determining the extent of immune complex deposition in pauci-immune pathologies. Therefore, this case report contributed to that discussion while also providing a different presentation of MPO that had more of a nephrotic picture.

REFERENCES

- ¹ Lewis JB, Neilson EG. Glomerular Diseases. In: Jameson J, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J. (Eds.) Harrison's Principles of Internal Medicine. Twentieth Edition. New York: McGraw Hill Education, 2018. ISBN-10: 1259644030.
- ² Sumida K, Ubara Y, Nomura K, et al. ANCA-associated crescentic glomerulonephritis with immune complex deposits. *Clin Nephrol* 2012; 77(6):454-460. PMID: 22595387.
- ³ Lin W, Shen C, Zhong Y, et al. Glomerular immune deposition in MPO-ANCA associated glomerulonephritis is associated with poor renal survival. *Front Immunol* 2021; 12:625672. PMID: 33841408.
- ⁴ Ge Y, Yang G, Yu X, et al. Outcome predictors of biopsy-proven myeloperoxidase-anti-neutrophil cytoplasmic antibody-associated glomerulonephritis. *Front Immunol* 2021; 11:607261. PMID: 33613528.
- ⁵ Haas M, Eustace JA. Immune complex deposits in ANCA-associated crescentic glomerulonephritis: A study of 126 cases. *Kidney Int* 2004; 65(6):2145-2152. PMID: 15149327.
- ⁶ Neumann I, Regele H, Kain R, Birck Rainer, Meisl FT. Glomerular immune deposits are associated with increased proteinuria in patients with ANCA-associated crescentic nephritis. *Nephrol Dial Transplant* 2003; 18(3):524-531. PMID: 1254274.

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