

Rapidly Progressive Glomerulonephritis Due to ANCA-Associated Glomerulonephritis in a Patient with Diabetic Nephropathy: A Case Report

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Abstract

Background

Rapidly progressive glomerulonephritis (RPGN) is a clinical syndrome marked by a rapid decline in kidney function over a short period, typically days to weeks, and is commonly associated with crescent formation on renal histopathology. In individuals with diabetic nephropathy, differentiating superimposed glomerular disease from the natural progression of chronic kidney disease (CKD) can be difficult due to overlapping clinical features.

Objective

To describe ANCA-associated glomerulonephritis presenting as rapidly progressive glomerulonephritis in a patient with diabetic nephropathy and emphasize early diagnosis.

Case-Presentation

A 56-year-old woman with a history of type 2 diabetes mellitus, hypertension, and CKD presented with dysuria, reduced urine output, generalized edema, and systemic symptoms. Laboratory investigations revealed a sharp increase in serum creatinine, necessitating urgent initiation of hemodialysis. Urinalysis demonstrated active sediment including hematuria and proteinuria, and serological testing was positive for c-ANCA. Renal biopsy findings were consistent with crescentic glomerulonephritis, confirming ANCA-associated glomerulonephritis superimposed on diabetic nephropathy.

Conclusion

This case underlines the need for early recognition of ANCA-associated glomerulonephritis presenting as RPGN in diabetic patients with atypical clinical features and highlights the critical role of renal biopsy and timely immunosuppressive therapy.

Keywords

Rapidly progressive glomerulonephritis; ANCA-associated glomerulonephritis; Diabetic nephropathy; Crescentic glomerulonephritis; Renal biopsy

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Introduction

Rapidly progressive glomerulonephritis (RPGN) is defined by a swift deterioration in renal function and is histologically characterized by crescent formation¹. Among the various causes, ANCA-associated glomerulonephritis represents a significant etiology and requires early diagnosis to prevent irreversible renal damage¹. Diabetic nephropathy remains the most prevalent cause of CKD globally and generally

follows a slow and progressive course². However, the presence of unusual features such as hematuria, sudden worsening of renal function, or active urinary sediment should raise suspicion for an additional non-diabetic renal pathology³. Coexistence of non-diabetic renal diseases, including ANCA-associated glomerulonephritis, in patients with diabetic nephropathy has been increasingly recognized, complicating clinical assessment⁴. In such circumstances, renal biopsy is indispensable for establishing an accurate diagnosis⁵. Moreover, ANCA-associated glomerulonephritis may present as a renal-limited condition without systemic manifestations, which can delay recognition⁶. Early diagnosis and prompt initiation of therapy are essential to improve renal outcomes⁷.

Case Presentation

Patient Information

A 56-year-old widow, housewife, presented with burning sensation during micturition for 7 days, reduced urine output (~500 mL/day), reddish discoloration of urine, generalized swelling, weakness, anorexia, nausea, and occasional vomiting. She was a known case of type 2 diabetes mellitus for 9 years (on insulin), hypertension for 5 years, and CKD diagnosed 4 months earlier (baseline serum creatinine ~2 mg/dL). There was no history of nephrotoxic drug intake or similar illness in the family.

Clinical Findings

On examination- puffy face, moderate anemia, bilateral pitting edema, blood pressure: 140/90 mmHg, pulse: 78 beats/min, and ascites was present (shifting dullness positive). In fundoscopy there was non-proliferative diabetic retinopathy. Other systemic examinations were unremarkable.

Investigations

Serum creatinine increased from 2.0 mg/dL to 8.7 mg/dL on admission which leads to urgent hemodialysis. Gradual fluctuation occurred with reduction to 3.2 mg/dL at discharge.

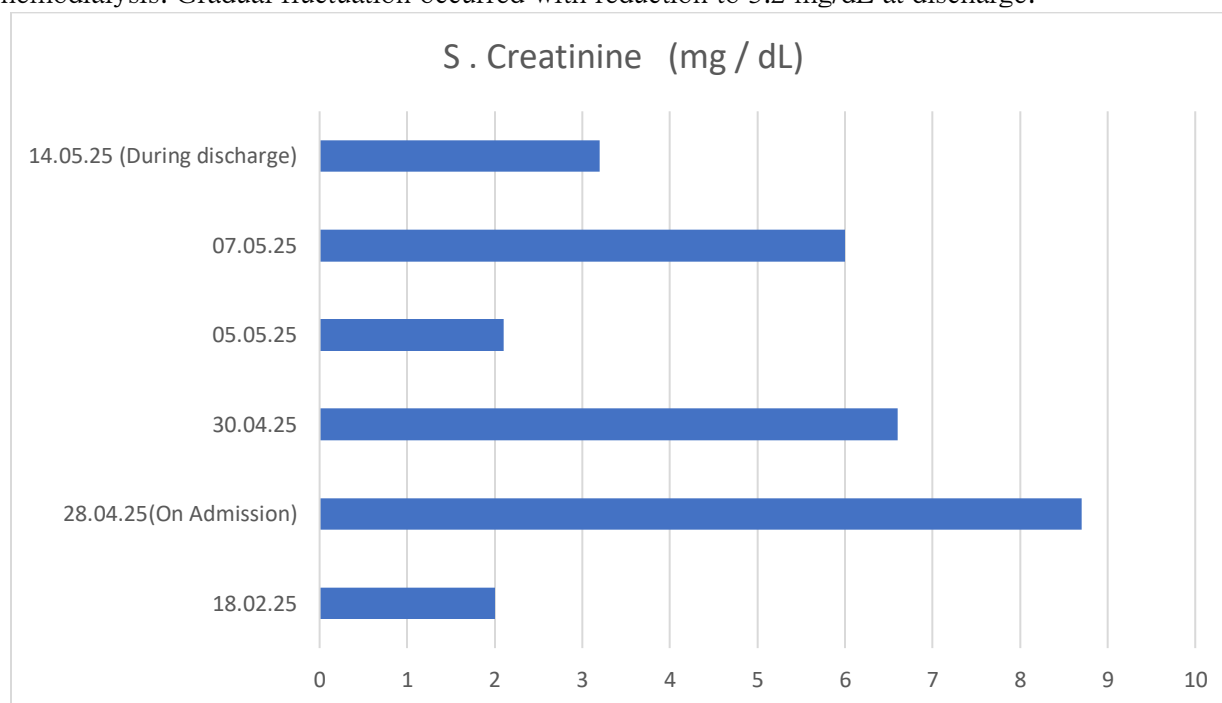


Figure 1: Trend of serum creatinine during hospital course

DM & RPGN

Urinalysis showed proteinuria (+++), hematuria and pyuria. Dysmorphic red blood cells present and urine culture found *E. coli*.

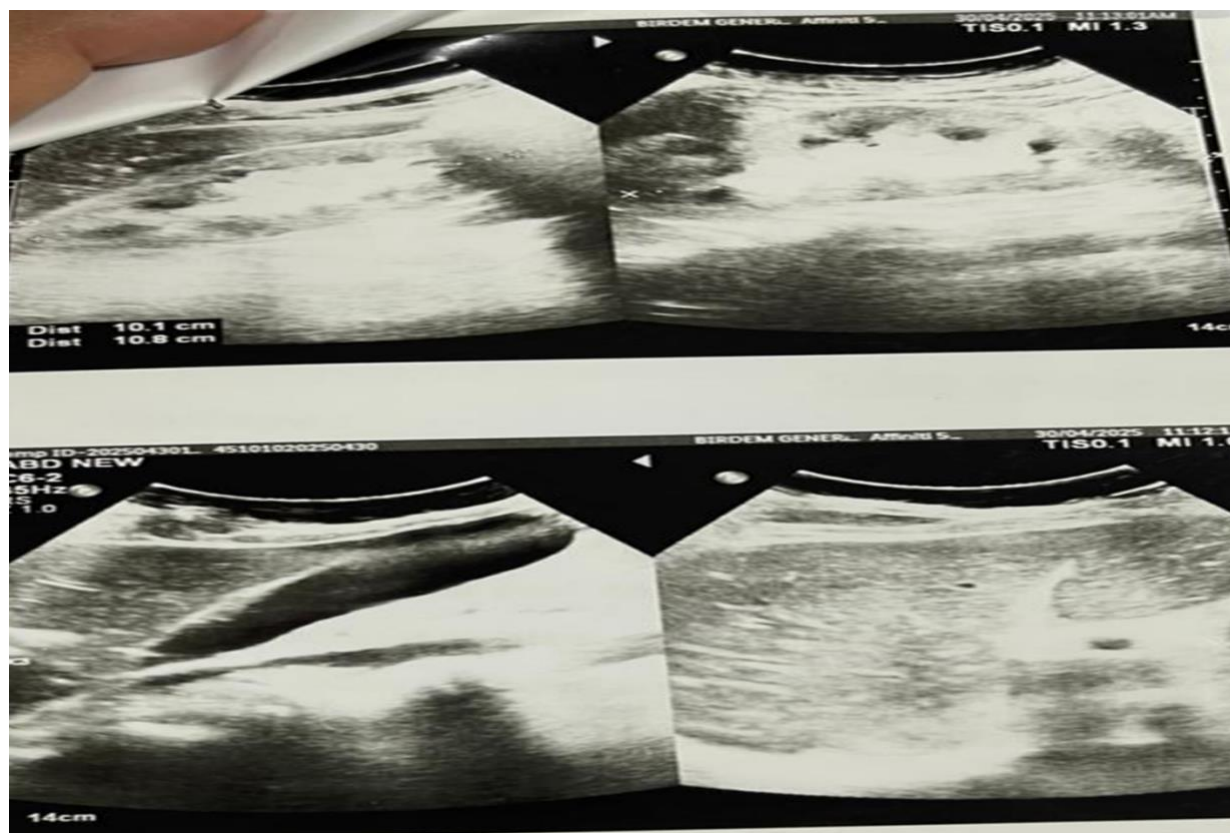
Hematological findings were hemoglobin: 6.7 g/dL (improved after transfusion) and leukocytosis with neutrophilic predominance

Serological tests showed c-ANCA: Positive, ANA, anti-dsDNA: Negative and Complement levels was within normal limits.

Ultrasonography showed Rt kidney in normal size (101 mm), shape with increased parenchymal echogenicity and poorly define CMD and Lt kidney was in normal size (108 mm), shape with parenchymal echogenicity and poorly define CMD which suggest Renal parenchymal disease with mild Ascites

Figure 2: Bilateral renal parenchymal disease with mild ascites

In renal biopsy 16 glomeruli identified; 11 globally sclerosed, one fibro cellular crescent present



mesangial hypercellularity and inflammatory infiltrates. Tubular casts (hyaline, granular, red cell) present and findings consistent with ANCA-associated glomerulonephritis on background diabetic nephropathy

RENAL PATHOLOGY REPORT

DBCL No:	25015434	Receiving Date:	12.05.2025
Lab ID No:	DIF-0720	Reporting Date:	19.05.2025
Patient's Name:	H- 2505-0720	Age:	56 Yrs.
Referred by:	Assoc. Prof. Dr. Mehruba Alam Ananna MBBS, FCPS (Medicine)	Sex:	Female
Address:	BIRDEM General Hospital, Dhaka.		
Specimen/Tissue:	Renal biopsy for histopathology & DIF		

Clinical Note: Female 56 years presented with vomiting anorexia and burning sensation during micturition. She is a known case of DM and hypertension. She is suspected as GNI and ANCA vasculitis.

Lab Investigation: Urine albumin: 1+, RBC: 20-25/HPF, UTP: 0.62 gm/24hrs, Serum albumin: 3.38 gm/dl, Serum creatinine 3.2 mg/dl, Serum cholesterol: ?, Serum C3: 167, Serum C4: 45, ANA: negative, C-ANCA: positive, P-ANCA: negative, HBsAg: negative, Anti-HCV: negative.

Gross Description:

One core of renal tissue is received in formalin measuring 0.5 cm in length.

Section code: Embedded as such in one block.

Microscopic Examination: H&E, PAS, Masson trichrome & Silver stain.

Sections show renal cortex and medulla comprising 16 glomeruli. Eleven of these are globally sclerosed and one shows fibrocellular crescent. The non sclerosed glomeruli are enlarged, show mild increase in mesangial matrix and cells with few polymorphs. Glomerular basement membrane is not thick. Tubules contain hyaline, granular and red cell casts. Interstitium reveals mild to moderate mixed inflammatory infiltrate. Blood vessels are unremarkable.

DIF Study:

Gross: One core of renal tissue is received in Michel's solution measuring 0.3 cm in length.

Microscopic description:

Glom: 04	IgG	IgA	IgM	C3	C1q	Kappa	Lambda
Location	-	-	-	-	-	-	-
Pattern	-	-	-	-	-	-	-
Intensity	-	-	-	-	-	-	-

Diagnosis: Renal tissue (Needle core biopsy): ANCA related glomerulonephritis.

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Figure 3: Renal biopsy showing ANCA related glomerulonephritis

Management

Patient was managed by hemodialysis 8 sessions via right femoral venous catheter, antibiotic therapy for urinary tract infection, blood transfusion (3 units), fresh frozen plasma, pulse methylprednisolone (1 g daily for 3 days), oral corticosteroids (1 mg/kg body weight), and cyclophosphamide therapy. Renal biopsy performed after infection control

Outcome and follow-up

Urine output initially improved to approximately 1200 mL/day, later stabilizing at 700 – 800 mL/day. Serum creatinine decreased to 3.2 mg/dL at discharge. The patient was advised to continue twice-weekly hemodialysis and follow up regularly.

Discussion

This case highlights the occurrence of ANCA-associated glomerulonephritis presenting as RPGN in a patient with pre-existing diabetic nephropathy. Typically, diabetic nephropathy progresses gradually; therefore, a sudden decline in renal function, particularly when associated with hematuria and active urinary sediment, should prompt evaluation for a superimposed glomerular disease³.

Previous similar studies suggests that non-diabetic renal diseases are relatively common among diabetic patients and are frequently diagnosed only after histopathological examination^{4,5}. In this patient, renal

biopsy confirmed crescentic glomerulonephritis, establishing the diagnosis of ANCA-associated glomerulonephritis.

ANCA-associated glomerulonephritis can present without systemic manifestations, as observed in this case, which may delay diagnosis⁶. The concurrent presence of urinary tract infection further complicated the clinical scenario.

The management strategy, including corticosteroids, cyclophosphamide, and supportive hemodialysis, is in accordance with current treatment guidelines⁷. Although the patient showed partial recovery, the presence of chronic glomerular damage limited complete restoration of renal function.

Conclusion

In patients with diabetic nephropathy, rapid deterioration of renal function should prompt consideration of superimposed glomerular diseases. ANCA-associated glomerulonephritis may present as RPGN without systemic features and can easily be overlooked. Early diagnosis through renal biopsy and prompt initiation of appropriate therapy are crucial for improving outcomes and preventing irreversible renal damage.

Conflict of Interest: None

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