Normal complement in early poststreptococcal glomerulonephritis

Patients with acute poststreptococcal glomerulonephritis are usually found to have reduced serum concentrations of the third component of complement (C3), properdin, and total haemolytic complement (CH50).¹ We report here a unique variation of this pattern.

Case report

A previously healthy 7½-year-old boy was admitted to hospital after one day of macroscopic haematuria. Blood pressure was 110/80 mm Hg. Urine had a specific gravity of 1.010, contained protein (trace to +), and had more than 25 red blood cells per high power field but no casts. Complete blood count and smear showed unremarkable findings. No antinuclear antibody was present. Oral erythromycin was given for 10 days. The day before renal biopsy the blood pressure was 120/90 mm Hg, urinary protein excretion 794 mg/24 hours, and creatinine clearance 15 ml/min/1.73 m². Initial anti-streptolysin O titre was normal but subsequently increased (see figure). Because of progressive uraemia of uncertain cause, a percutaneous renal biopsy was performed on day 10. His condition gradually improved without other treatment.

Renal biopsy—Light microscopy of the renal biopsy showed 19 glomeruli, all of which were enlarged and diffusely hypercellular with proliferation and swelling of endothelial and mesangial cells. A single glomerular epithelial crescent was noted. Fluorescent microscopy using specific fluorescein-labelled antisera showed diffusely positive staining along the capillary wall for IgG, IgM, C3, and properdin in a granular pattern. Electron microscopy showed rare subepithelial deposits.

Complement studies—The functional titrations were performed using specific cellular intermediates.² Protein levels of C1q, C4, C3, and properdin were measured by radial diffusion or rocket electrophoresis using mono-specific antisera.³ CH₅₀, C4, and C2 in the initial serum specimen (day 3) were above the mean of our normal population,² though still within two standard deviations. This initial serum specimen also had normal protein concentrations of C4, C3, and properdin but high normal factor B levels (see figure). CH₅₀ and haemolytic C1 on day 10 were below the normal range and both functional C4 and C2 concentrations had decreased though they were not abnormal. C3 and properdin were considerably below normal (< 2SD). Serum C4 and factor B protein concentrations had fallen slightly (see figure). Protein measurements of C4 and factor B then gradually increased while haemolytic C4 and C2 concentrations also tended to increase. By day 25 C3, properdin, and CH₅₀ had all returned to normal range, and both C3 and properdin showed high normal levels when last examined on day 85. A serum factor from the patient which partially cleaved C3 of normal serum by immunoelectrophoretic criteria was detected on days 3 and 10, but its concentration subsequently decreased.

Comment

This case calls attention to an unreported complement profile in poststreptococcal glomerulonephritis. Normal or high normal serum complement components (CH50, C1, C4, C2, C3, properdin, and factor B) were present three days after the onset of gross haematuria, and the characteristically decreased levels of C3, properdin, and CH50 were not found until day 10.

We think that this patient was first studied very early in the progression of acute poststreptococcal glomerulonephritis, when complement consumption, though present, was adequately compensated by an increased synthetic rate. It has been proposed that C3 breakdown products decrease C3 synthesis,³ and possibly this patient was studied before decreased synthesis of C3 was induced. Radioactive turnover studies of complement components would be required to prove this. A C3-activating factor was detected and a similar or identical factor has been reported in acute poststreptococcal glomerulonephritis and chronic membranoproliferative glomerulonephritis. Sequential changes in complement and C3-activating factor similar to those we saw have been reported in a patient with pneumococcal glomerulonephritis, but poststreptococcal glomerulonephritis was not completely excluded.⁴

Experimental studies of nephritis⁵ are consistent with our hypothesis that our patient was studied early in the course of his disease,

Serum creatinine and serum complement component protein titres (C4, C3, factor B, and properdin) in patient with acute poststreptococcal glomerulonephritis. Shaded areas are normal range (± 2 SD). Properdin is expressed as percentage of reference serum.

Conversion: SI to traditional units—Creatinine: 1 $\mu\text{mol/l} \approx 0.0113 \text{ mg/100 ml}$.

when glomerulonephritis was already present but when the serum complement catabolic rate was more than compensated for by the simultaneously increased complement synthesis.

¹ William, D G, et al, *Clinical and Experimental Immunology*, 1974, **391**, 1974.

² McLean, R H, et al, *American Journal of Medicine*, 1976, **60**, 60.

³ Charlesworth, J A, et al, *Journal of Clinical Investigation*, 1974, **53**, 1578.

⁴ Hyman, L R, et al, *American Journal of Medicine*, 1975, **58**, 810.

⁵ Schwab, L, et al, *Journal of Experimental Medicine*, 1950, **91**, 505.

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