Adverse reactions develop in roughly one third of patients treated with gold, the proportion varying from 5% to 80% in several reported series.[1] Eosinophilia occurs in roughly 5% of patients and has been directly correlated with the development of gold toxicity.[2] Vasomotor reactions to gold are not uncommon, but whether they indicate the development of more serious gold toxicity is unknown. Neurological complications, including peripheral neuropathy, myokymia, and a syndrome like the Guillain-Barré syndrome,[3] have received little attention even in major textbooks of rheumatology.[4] Encephalopathy has been reported: McAuley *et al* described a patient who recovered fully one month after treatment with gold was stopped.[5]

The severity of the illness in our patient, with residual neurological deficit nearly five months afterwards, shows the serious side effects that may occur during chrysotherapy.

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Nephrotic syndrome during treatment with interferon

Interferon has activity against multiple myeloma.[1] In a trial of lymphoblastoid interferon A (Wellferon) given by ambulatory intravenous infusion for myeloma a patient with renal damage developed a nephrotic syndrome.

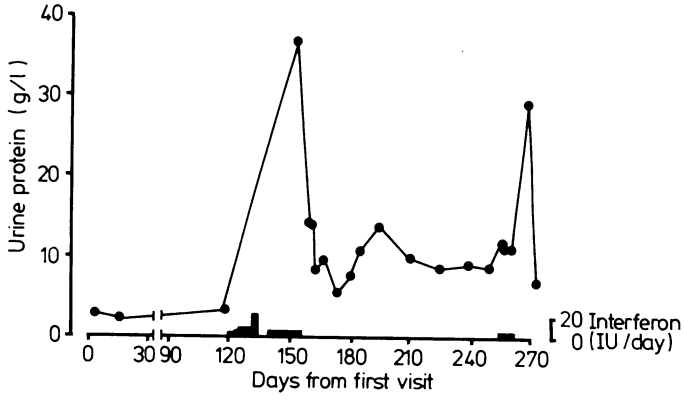
Case report

A 42 year old white woman presented with an IgGL myeloma in February 1980. Serum urea and creatinine concentrations were normal, but her urine contained Bence Jones protein. She received oral melphalan, but the condition did not improve.

She was referred to us in June 1983 suffering from back pain. She was kyphotic. Investigations showed extensive lytic bone disease and heavy infiltration of bone marrow with myeloma cells. Serum urea and creatinine concentrations were normal, and her creatinine clearance was 82 ml/min. The serum contained 45 g IgGL paraprotein/l. Urine contained 6 g protein/l with a trace of Bence Jones protein and a prominent leak of paraprotein. There was severe immune suppression, with a serum IgA concentration of $< 0{\cdot}1$ g/l. Intravenous cyclophosphamide produced transient benefit, but the disease progressed and in November she was admitted for a trial of interferon given by continuous intravenous infusion.

The figure shows the interferon dosage and urinary protein excretion. The urine volume was consistently about two litres daily. The maximum urinary protein concentration, 34 days after the start of interferon, was 37 g/l, with non-selective proteinuria including 14 g albumin/l, 11 g paraprotein/l, and 2 g lambda light chain/l. The electrophoretic patterns of serum and urinary protein were almost identical, indicating an almost complete leak. Her glomerular filtration rate was 44 ml/min. Her serum albumin concentration fell to 17 g/l and she developed bilateral ankle oedema. The serum creatinine concentration remained unchanged. Ultrasonography of the kidneys yielded normal results. There were no autoantibodies. Concentrations of C3 and C4 were slightly reduced, possibly owing to loss of protein in the urine. Tests for immune complexes (C1q binding and the platelet aggregation test) yielded negative results.

Interferon was stopped and the urinary protein concentration fell rapidly. Serum myeloma protein concentration had fallen during treatment, and this led us to try a further course of interferon three months later (figure). Her proteinuria immediately deteriorated but again fell rapidly when interferon was withdrawn. On this occasion the serum creatinine concentration rose from 138 μmol/l (1·6 mg/100 ml) before treatment to 181 μmol/l (2·0 mg/100 ml) during treatment and returned to 140 μmol/l (1·6 mg/100 ml) after interferon had been withdrawn.



Dosage of interferon given and urinary protein excretion.

Comment

In this case a nephrotic syndrome developed during treatment with interferon in a patient whose kidneys had been damaged by myeloma. The abnormality decreased when interferon was withdrawn but recurred when interferon was reintroduced. Although the nephrosis was rapidly reversed once interferon was stopped, evidence of renal damage remained.

Averbuch *et al* described a case in which intermittent intramuscular recombinant leucocyte interferon A produced both a nephrotic syndrome and renal failure in a patient with mycosis fungoides.[2] A renal biopsy specimen showed acute interstitial nephritis. Sherwin *et al* did not detect any evidence of a nephrotic syndrome in patients treated with leucocyte interferon A.[3] Kramer *et al* described three cases in which interferon was given as an antiviral agent after renal transplantation.[4]

We suggest that careful observation of all patients who are treated with interferon is necessary to avoid renal failure. Our observations suggest that the development of proteinuria, or an increase in its severity, may be the first indication of this complication and that regular testing for urinary protein is essential during treatment with interferon.

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