Brown's syndrome: an important cause of diplopia in systemic lupus erythematosus

Brown's syndrome is caused by a mechanical limitation of the superior oblique tendon. This simulates a palsy of the inferior oblique muscle with limitation of elevation in adduction. The syndrome can be congenital or acquired. Acquired Brown's syndrome has been described in collagen vascular diseases including rheumatoid arthritis and Still's disease. 1,2

Two case reports have described Brown's syndrome in systemic lupus erythematosus (SLE) in adults, 3, 4 but no cases of Brown's syndrome in a juvenile with SLE have been reported to date.

A 14 year old girl was referred to the ophthalmic department with a two day history of diplopia and arthralgia of her hands. She had a three year history of SLE that had been complicated by rashes, arthritis, cerebral vasculitis (two years previously), and was recently under investigation for haematuria. She had been receiving prednisolone in variable doses since the diagnosis was made.

On general examination, the patient had a butterfly rash, cshingoid features, and mild swelling of the small joints of her hands. Ocular examination revealed visual acuities of 6/6 in both eyes. Her eye movements showed restricted elevation in adduction of the left eye. Pupillary responses and other ocular examination were normal. There was tethering over the left trochlear, but no clicking sound or sensation noted on eye movement. A Hess chart revealed limited elevation in adduction, with no superior oblique overaction of the left eye, consistent with a left Brown's syndrome (figure). The patient declined a forced duction test.

Laboratory studies were consistent with active SLE: leucocyte count 2.8 × 10^9/l (neutrophils 2.0 × 10^9/l, lymphocytes 0.7 × 10^9/l); antinuclear factor was increased to 1600 and DNA antibodies to 1650 IU/ml (normal range up to 60 IU/ml). Serum complement component C3 was 0.64 (normal range 0.8–1.9 g/l) and C4 was <0.08 (normal range 0.12–0.4 g/l).

A diagnosis of Brown's syndrome secondary to SLE was made. The patient's steroids were increased from 5 mg of prednisolone on alternate days to 30 mg per day. Her symptoms improved in one week and completely resolved by two weeks, confirmed by normal Hess test.

Six weeks later, ophthalmological investigation showed a plasma creatinine of 70 μmol/l, plasma albumin 43 g/l and a normal protein/creatinine index. Renal biopsy revealed mild lupus nephritis (World Health Organisation type 2A). During this hospital stay she had a further episode of vertical diplopia. Computed tomography (CT) and magnetic resonance imaging scans of her head, for presumed intracerebral cause, revealed no local or intracranial pathology. With the combination of diplopia and increased markers for SLE activity, intracranial involvement was assumed and a course of cyclophosphamide was subsequently given on an outpatient basis. Although no ophthalmological assessment was made, a recurrence of her Brown's syndrome was a possibility, and this diagnosis may have prevented the need for cyclophosphamide.

The causes of Brown's syndrome can be divided into two main categories—inflammation and trauma—both involving the muscle, tendon, trochlear, or surrounding tissue of the superior oblique muscle. 5

Two descriptions of Brown's syndrome associated with SLE have been of a 27 year old woman and a 30 year old man, 6 the former successfully treated with a combination of indomethacin and prednisone, but not in the latter with ibuprofen alone. In our patient, inflammatory markers indicated active SLE and her diplopia was resolved by increasing the dose of her oral steroid.

Diplopia in patients with SLE has usually been attributed to nervous system disease caused by a microvasculitis. The exact cause for Brown's syndrome in SLE is unknown, but is thought to be a tenosynovitis of the superior oblique tendon.

Clinically, patients with Brown's syndrome present with vertical diplopia that is worse on adducting and elevating the affected eye, often with associated pain and tenderness in the trochlear region. Examination, Hess chart, and forced traction test confirm restricted elevation in adduction. An orbital CT scan may reveal local pathology, but this is not always the case.

Treatment of inflammatory Brown's syndrome is dependent on the cause. In addition to oral steroids and non-steroidal anti-inflammatory drugs, 1, 2 local steroid injections have been used successfully. 7 In those patients who fail to respond, superior oblique tenotomy combined with inferior oblique recession has been advocated. 8

This case report illustrates the importance of involving the ophthalmologist in cases of SLE with diplopia. The true incidence of Brown's syndrome in SLE is probably much greater than the few reported cases would suggest. Ophthalmological assessment would help in distinguishing between nervous system disease and this local mechanical problem found in these patients.

G WALTERS J N BRADBURY
Department of Ophthalmology, Bradford Royal Infirmary, Bradford, United Kingdom

Correspondence to: Dr G Walters, Department of Ophthalmology, St James's University Hospital, Beckett Street, Leeds LS9 7TF, United Kingdom.


Mechanism of haematuria in lupus nephritis

While the renal manifestations of systemic lupus erythematosus (SLE) vary with the severity of the renal lesion, proteinuria is present in the vast majority of cases. Haematuria, which is less common, is usually microscopic, but may be macroscopic in an occasional patient. 1 Haematuria seems to result from the passage of red blood cells through anatomical gaps in the glomerular basement membrane (GBM). While such gaps have been described in patients with various forms of glomerulonephritis, including those with lupus nephritis associated with haematuria, 2 the passage of red blood cells (RBCs) through these gaps has been demonstrated only in patients with focal proliferative glomerulonephritis, 3 mild proliferative glomerulonephritis, 4 and membranous nephropathy. 5 Passage of RBCs has also been demonstrated in our model of experimental glomerulonephritis. 6 We now report a patient with SLE and lupus nephritis in...
whom a renal biopsy specimen showed the escape of RBC through a gap in the GBM. This 23 year old Japanese woman was admitted to our hospital for the further evaluation of the nephrotic syndrome associated with SLE. When the diagnosis was first made eight years earlier, she had exhibited a high fever, typical butterfly rash, and pain in both knees. Laboratory tests at that time revealed leucopenia, positivity for serum antinuclear antibody and DNA antibody, and a low level of complement. She received treatment with prednisolone under the supervision of a local physician. One month before the present admission, she felt generally fatigued and developed oedema of the face, hands, and legs. Physical examination on admission revealed a pigmented butterfly rash on the face and leg oedema. Her blood pressure was 106/66 mm Hg. Her heart and the lungs were normal. Urine analysis showed proteinuria of 3-7 g/day, microscopic haematuria (10 RBCs/high power field (HPF)) with dysmorphic erythrocytes, leucouria (15 leucocytes/HPF), and granular casts. Laboratory study revealed a slight deterioration of renal function (creatinine clearance 64 ml/min, blood urea nitrogen 240 mg/l and creatinine 6.1 mg/l). Serum total protein was 41.2 g/l, albumin 25 g/l and total cholesterol 3430 mg/l. The RBC count was $380 \times 10^9/\text{mm}^3$, leucocyte count $7400/\text{mm}^3$, and platelet count $18 \times 10^9/\text{mm}^3$. Tests for LE cells and for antinuclear factor were both positive. The serum DNA antibody titre was 30 U/ml (normal value (NV) less than 7 U/ml), and serum complement was decreased: haemolytic complement (CH50) 16-6 U/ml (NV 30–40 CH50 U/ml); C3 262 mg/l (NV 450–870 mg/l); C4 119 mg/l (NV 120–370 mg/l).

Examination of a percutaneous renal biopsy specimen by light microscopy revealed 10 glomeruli, one of which showed global sclerosis. One other glomerulus showed crescent formation and the remaining glomeruli showed evidence of a mild proliferative lesion with focal wire loop and hyaline thrombi. Immunofluorescent microscopy revealed a fine granular pattern along the glomerular capillary wall with a slight mesangial staining pattern for antihuman IgG, C3, and C1q.

Electron microscopic study revealed an increased number of mesangial cells and an infiltration of leucocytes to the glomeruli. Electron dense deposits were observed mainly in the subepithelial layer with less localisation in the mesangium and subendothelium. Some electron dense deposits occupied the entire layer of the GBM. Striking changes in the GBM included a generalised thickening, attenuation, wrinkling, notching, and rupturing. Numerous red blood cells with an irregular surface were observed in the urinary space (figure A). The RBCs in the capillary lumen were smooth. Escape of RBCs was observed from the capillary lumen into the urinary space close to the site of mesangial interposition (figure, B). Epithelial cells showed vacuolation and fusion of the foot processes. Microscopic findings were compatible with a diagnosis of diffuse membranous glomerulonephritis associated with lesions of diffuse glomerulonephritis.

The World Health Organisation morphological classification was lupus nephritis IV-d.

The escape of red blood cells through a gap in the GBM was demonstrated in this patient with lupus nephritis. The cause of this phenomenon is not completely understood. Several factors seem to be involved in damaging the GBM and in leading to its perforation. Patients with the immune complex type of glomerulonephritis exhibit rupture of the GBM in areas in which the thickness of the basement membrane is infiltrated by electron dense deposits. Such deposits may replace or greatly interfere with the structure of the GBM and thus create points of weakness to even simple mechanical factors.

Leucocyte protease is important in the mechanical disruption of the GBM. The migration of polymorphonuclear leucocytes1 and of monocytes2 into Bowman's space has been reported. Exudation of leucocytes in the glomerulus and in the urine are characteristic of lupus nephritis. The urinary sediment that contains erythrocytes, leucocytes and various casts is termed 'telescoped sediment'.1 Thus the leucocytes in the urine may also originate from glomerular capillary.

One characteristic of glomerular bleeding is the excretion of dysmorphic RBCs in the urine. The RBCs that originate in the glomerulus are dysmorphic, whereas those that originate in other parts of the urinary tract are uniformly isomorphic.2 The altered morphology of the RBCs that originate in the glomerulus may reflect the mechanism of their entry from the capillary lumen into the urinary space, as described by Lin et al.1 Those authors showed that, in a case of membranous nephropathy with structural gaps in the GBM, the deformability of the RBCs allowed them to be pushed through the gaps into the urinary space. They suggested that the combined forces of the pulsatile glomerular capillary hydraulic pressure and the elasticity of the GBM, while pushing the red cells through these gaps, also produced shearing stresses to the red cell surface, thus causing deformation.

This is the first report demonstrating the morphological basis of haematuria in lupus nephritis.

HIOFUMI MAKINO
NIKKEI KAWASAKI
KAZUAKI MURAKAMI
KAZUE HIRONAKA
TETSUHIKO AMANO
ZENJIRO OTA

Third Department of Internal Medicine,
Okayama University Medical School,
Okayama, Japan
Successful application of high dose intravenous immunoglobulins in Sjögren’s syndrome associated arthritis

High dose intravenous immunoglobulins (IVIg) have become an important treatment in a number of autoimmune disorders. Both controlled and uncontrolled studies have demonstrated beneficial effects of IVIg in rheumatic diseases such as dermatomyositis, rheumatoid arthritis, and systemic lupus erythematosus. We report our experience with IVIg in a patient with Sjögren’s syndrome.

A 39 year old man presented for the first time in 1992 with a three year history of painful swelling of both parotid glands without signs of infection. A keratoconjunctivitis sicca which had been confirmed by Schirmer’s test required the use of tear substitutes. In addition, the patient had developed an incapacitating, non-erosive arthritis involving the hand, carpal tunnel syndrome, bilateral ulnar neuropathy, and proximal interphalangeal (PIP) joints, the knees, and the ankles. Serological evaluations revealed high titers of anti-nuclear antibody (ANA), anti-Sm (SS-A) and anti-La (SS-B) antibodies, and increased titers of rheumatoid factor. Serum IgG was increased to 30-4 g/l without IgG subclass imbalance. The patient fulfilled four of the 1992 American College of Rheumatology criteria for the diagnosis of Sjögren’s syndrome. Treatment with NSAID was initiated because of persisting arthritis, but without success. Prednisolone was effective in doses up to 30 mg per day, but had to be withdrawn because of signs of iatrogenic Cushing’s syndrome, including hypertension and impotence. Treatment with methotrexate was refused by the patient because of the risk of impaired fertility.

We therefore decided to institute IVIg treatment. The patient received 30 g of a sulphonated IVIg (Immunglobulinum™, Behringwerke AG, Marburg, Germany) on each of days 1 to 4 and 21 to 24. Except for one period of headaches, the IVIg were well tolerated and led to a remarkable improvement in the arthritis. This was manifested by a reduction in the cumulative PIP joint circumference from 562 mm before treatment to 550 mm at day 30, and a simultaneous increase in grip strength from 80/180 mm Hg (left/right) to 280/300 mm Hg. In addition, a distinct resolution of the patient’s parotid gland swelling was noted. Serologically, IVIg treatment resulted in an increase in serum IgG to 56.0 g/l at day 5 and 41.1 g/l at day 30. While titers of ANA, anti-SS-A and anti-La (SS-B) antibodies were not affected, the erythrocyte sedimentation rate decreased from 32 mm/1st h to 5 mm/1st h within 50 days, accompanied by a parallel decrease in C reactive protein from 27 to 8-5 mg/l. The beneficial effects lasted for a total of three months. During month 4, moderate joint pain recurred, but it was controlled adequately by NSAID for the ensuing two months. However, at the end of month 6 a severe relapse of arthritis occurred. IVIg treatment was reinstituted, followed again by a distinct relief of joint swelling and pain.

Our observations suggest a beneficial effect of IVIg in a patient with Sjögren’s syndrome associated arthritis, which is one of the most common extraglandular disease manifestations of this symptom complex. Although spontaneous remission cannot be excluded definitively, this seems to be unlikely because the clinical improvement closely followed IVIg administration and was reproducible in a flare of the disease. To our knowledge, this is the first description of the application of high dose IVIg in Sjögren’s syndrome. As many patients with this condition present with increased IgG levels, they are considered at risk of developing symptoms of hyper-viscosity4; however, despite high IgG levels before treatment, no major side effects occurred in our patient. Although our observation in a single patient requires confirmation in others, it does suggest an additional treatment option for selected Sjögren’s syndrome patients with extraglandular manifestations in whom conventional treatment fails or is contraindicated.

In summary, high dose IVIg treatment of a patient with Sjögren’s syndrome associated arthritis represents a new modality of treatment which is to be recommended in such cases.
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H Makino, H Kawasaki, K Murakami, K Hironaka, T Amano and Z Ota

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