A patient with systemic lupus erythematosus and *Salmonella enteritidis* bacteraemia complicated by rhabdomyolysis and acute cholecystitis

Sir, Infections are a major source of morbidity and mortality in patients with systemic lupus erythematosus (SLE) [1–3]. Among the most common opportunistic bacterial infections seen in SLE are those caused by *Salmonella*, especially *S. typhimurium* and *S. enteritidis*. Extra-intestinal infections seem to have been reported more frequently [4, 5]. We describe a patient with SLE and *S. enteritidis* bacteraemia complicated by rhabdomyolysis and cholecystitis.

A 27-yr-old Caucasian woman was admitted to the intensive care unit because of high fever (41°C) and somnolence in September 1998. In 1996, SLE was diagnosed on the basis of the characteristic butterfly rash, alopecia, polyarticular arthritis, haemolytic anaemia, myositis, oral ulcers, positive antinuclear antibodies and positive anti-double-stranded DNA (anti-dsDNA) antibodies. Despite extensive treatment with oral corticosteroids and azathioprine, she continued to suffer from arthritis and arthralgia and was highly positive for anti-dsDNA. She was started on hydroxychloroquine in August 1998. On the day of admission, a friend found her, barely conscious. Two days before admission she had complained of a severe headache, pale stools, and a rash. On admission, she appeared very ill. Her Glasgow Coma Scale was E4M6V4, APACHE score II 20. Her temperature rose to 40.6°C. Her blood pressure and pulse were 106/86 mmHg and 140 beats/min, respectively. She had 'rose' spots on her abdomen and legs. Tenderness in the right upper abdomen was noted on palpation. Bowel sounds were present. Neurological examination was difficult. No signs of meningism were noted. She followed commands reliably and tried to answer questions. Palpation of muscles was painful and considerable loss of muscular strength was apparent in the proximal as well as distal muscles of upper and lower extremities. Haematological laboratory findings and blood chemistry values on the day of admission and subsequent days are shown in Table 1. No Howell–Jolly bodies were found in a red blood cell smear. Fibrinogen was 7.0 g/l (normal value 2.0–4.0 g/l) and fibrin degradation products were 2.0 mg/l (normal value <0.5 mg/l). Lumbar puncture did not reveal abnormalities. Urinalysis did not show any hyaline or erythrocyte casts, but was positive for myoglobin. Lactate was normal (<2.5 mmol/l) as was a blood gas analysis. IgG and IgA concentrations were 7.3 and 1.2 g/l, IgM was low (0.7 g/l). Complement C3 and C4 levels were 1.34 and 0.26 g/l (normal values), respectively. Severe bacterial infection and bacteraemia complicated by disseminated intravascular coagulation were suspected and she was started on intravenous ceftriaxone. Vigorous hydration was started. Corticosteroids were given intravenously. Azathioprine and hydroxychloroquine were discontinued temporarily. The first day after admission, several blood, urine and stool cultures revealed *S. enteritidis* and she was started on intravenous ciprofloxacin. The patient seemed to respond to antibiotic therapy but remained weak and experienced increasing abdominal pain with tenderness in the right upper quadrant. Laboratory examination showed an increasing creatine phosphokinase (CK) level with a maximum of 45 429 U/l on the fourth day after admission, and a maximum myoglobin of 3270 μg/l. Owing to adequate

Table 1. Haematological laboratory findings and blood chemistry values

Variable	Normal range	9 days before admission	Admission	Day 1 after admission	Day 2 after admission	Day 3 after admission	Day 4 after admission	Day 10 after admission	Day 16 after admission
Haemoglobin (mmol/l)	7.4–9.6	6.5	6.7	5.9	4.8	5.6	7.0[a]	7.3	7.6
Platelet count ($\times 10^9$)	150–450	244	100	84	80	74	72	130	243
White cell count ($\times 10^9$)	4.0–10.0	4.5	9.7	7.5	4.1	2.7	3.8	5.3	5.6
Differential count (%)									
Neutrophils			83	92		82		80	77
Band forms			10	0		0		0	0
Lymphocytes			3	7		12		17	15
Monocytes			3	1		5		1	3
Eosinophils			0	0		0		0	0
Basophils			0	0		0		0	0
Creatinine (μmol/l)	50–120	65	121	123	72	75	84	69	68
Alkaline phosphatase (U/l)	40–130		42	41			39		
Aspartate aminotransferase (U/l)	15–45		137	138	288	394	366	141	37
Alanine aminotransferase (U/l)	10–50	23	19	24	38	57	78	87	43
Lactate dehydrogenase (U/l)	300–620		2013	1827	3509	3258	3725	785	569
γ-Glutamyl transferase (U/l)	15–45		42	39			39		
Creatine phosphokinase (U/l)	15–180		2433	8053	30 041	28 044	45 429	2082	160
Myoglobin μg/l	<80		1914	1800	5080	2690	3270		

[a]After the patient received 2 units of packed cells.

fluid replacement, and alkalization (urine pH 6.5) by means of sodium bicarbonate, renal function did not deteriorate; it remained stable at 67 μmol/l after 4 days. Sixteen days after admission, CK returned to normal. Ultrasonographic examination on the second day after admission showed signs of cholecystitis and a single bile stone; cholecystectomy was performed. Microscopic examination revealed cholecystitis and activated macrophages. Bile cultures remained negative. On the fourth day after admission she was transferred to the Department of Rheumatology and Clinical Immunology. She appeared well but weak and physical therapy was started. Clinically, no signs of active lupus erythematosus were noted. Anti-dsDNA remained elevated, on average 400 IU/ml (Farr assay). No increase in anti-dsDNA during this infectious period was noted. Azathioprine and hydroxychloroquine were resumed and oral corticosteroids were continued. Ciprofloxacin was stopped after 21 days. She was discharged home after 34 days without any devices.

Acute cholecystitis is the most frequent reported extraintestinal manifestation of *Salmonella* infections [6]. *Salmonella enteritidis* was not cultured from the bile of our patient. At the time of the cholecystectomy, she had already received antibiotics for more than 48 h. In this patient rhabdomyolysis was attributed to the *S. enteritidis* infection. Other causes of rhabdomyolysis seemed unlikely: she was not known for alcohol or drug abuse, neither did she use diuretics, lovastatin or gemfibrozil; no electrolyte disturbances were found at admission; she had not undergone prolonged hyperthermia and exhibited no signs of crush syndrome or epilepsy. Rhabdomyolysis caused by *S. enteritidis* has only been reported a few times in the literature. Abdulla *et al.* [7] described two patients with severe rhabdomyolysis due to *S. enteritidis* complicated by acute tubular necrosis requiring haemodialysis in one case. Sion *et al.* [8] described a third patient with rhabdomyolysis leading to acute renal failure for which haemodialysis was necessary. The mechanism(s) responsible for rhabdomyolysis with *S. enteritidis* infection are poorly understood. Early recognition of the rhabdomyolysis, extensive fluid replacement and antibiotic treatment directed towards the cause of the rhabdomyolysis probably prevented acute tubular necrosis in our patient. Her renal function responded to conservative management and returned to normal after 2 days, although serum CK increased to 45 429 U/l on the fourth day after admission. Although hyposplenism has been described as a rare complication in patients with SLE, the peripheral blood cell smear of our patient did not reveal Howell–Jolly bodies as an indicator of splenic dysfunction [9]. No further studies were undertaken to determine the functional status of her spleen.

In summary, we have described a 27-yr-old SLE patient with *S. enteritidis* bacteraemia complicated by disseminated intravascular coagulation and extraintestinal manifestations, such as urinary tract infection, acute cholecystitis and rhabdomyolysis.

A. A. M. Blaauw, T. J. M. Tobé[1],
R. W. H. M. Derksen, J. W. J. Bijlsma

Department of Rheumatology and Clinical Immunology and [1]Department of Intensive Care and Toxicology, University Medical Centre, Utrecht, The Netherlands
Accepted 9 August 1999

Correspondence to: A. A. M. Blaauw.

1. Petri M. Infection in systemic lupus erythematosus. Rheum Dis Clin 1998;24:423–56.
2. Iliopoulos AG, Tsokos GC. Immunopathogenesis and spectrum of infections in systemic lupus erythematosus. Semin Arthritis Rheum 1996;25:318–36.
3. Pablos JL, Aragon A, Gomez-Reino JJ. Salmonellosis and systemic lupus erythematosus. Report of ten cases. Br J Rheumatol 1994;33:129–32.

4. Ramos JM, Garcia-Corbeira P, Aguado JM. Nontyphoid *Salmonella* extraintestinal infections in patients with systemic lupus erythematosus. J Rheumatol 1995;22:2193–4.
5. Li EK, Cohen MG. Nontyphoidal salmonella ovarian abscess in systemic lupus erythematosus. J Rheumatol 1995;22:575–6.
6. Cohen JI, Bartlett JA, Corey GR. Extra-intestinal manifestations of Salmonella infections. Medicine 1987;66:349–81.
7. Abdulla AJJ, Moorhead JF, Sweny P. Acute tubular necrosis due to rhabdomyolysis and pancreatitis associated with *Salmonella enteritidis* food poisoning. Nephrol Dial Transplant 1993;8:672–3.
8. Sion ML, Hatzitolios A, Toulis E, Kounanis A, Prokopidis D. Rhabdomyolysis and acute renal failure associated with *Salmonella enteritidis* bacteremia. Nephrol Dial Transpl 1998;13:532.
9. Piliero P, Furie R. Functional asplenia in systemic lupus erythematosus. Semin Arthritis Rheum 1990;20:185–9.