rhabdomyolysis. On examination, he was pale and febrile. He had periorbital puffiness, lip swelling, diffuse goitre and generalized non-pitting oedema. He had an atrophic plaque on his abdomen.

His laboratory findings were as follows: serum urea 32 mg/dl, creatinine 1.9 mg/dl, aspartate aminotransferase (AST) 122 IU/l, alanine aminotransferase (ALT) 66 IU/l, creatine kinase 2291 IU/l (normal <397), lactate dehydrogenase (LDH) 476 IU/l (normal 98–192), free T3 0.41 pg/ml (normal 1.8–4.6), free T4 0.06 ng/dl (normal 0.7–2), thyroid-stimulating hormone (TSH) >100 mIU/ml (normal 0.26–4.2), anti-microsomal antibody >600 IU/ml (normal <34) and anti-thyroglobulin antibody >4000 IU/ml (normal <115). His creatinine clearance was 58%. Other laboratory tests were normal. Ultrasonography and needle biopsy of the thyroid were concordant with thyroiditis. The biopsy made from the atrophic lesion was concordant with morphea.

Findings were compatible with autoimmune thyroid disorder, primary hypothyroidism and rhabdomyolysis. He received thyroxine replacement. His symptoms and laboratory values were normalized after 4 weeks of thyroxine replacement. However, his creatinine was still high. For this reason, we performed needle biopsy of the kidney. Examination of kidney biopsy specimens revealed oedematous renal medullary tissue.

Discussion. Hypothyroidism, though rare, should be considered a definite and authentic cause of rhabdomyolysis. The exact cause of rhabdomyolysis in hypothyroidism remains unclear. Usually an aggravating factor such as use of lipid-lowering drugs, alcohol, exercise or chronic renal failure has been identified [2,3]. Rhabdomyolysis manifests with muscular symptoms (e.g. myalgia and weakness) and severely elevated serum levels of muscle enzymes. It can become a life-threatening disorder when complicated by acute renal failure [2]. Thyroid hormone replacement therapy improves thyroid and renal functions and reverses rhabdomyolysis.

Only a few cases of rhabdomyolysis due to hypothyroidism have been reported [4–6]. The present case describes a patient suffering from rhabdomyolysis due to hypothyroidism.

As a result, hypothyroidism must be considered in patients presenting with acute renal failure and elevated muscle enzymes. As soon as the diagnosis is made, levothyroxin should be started.

Conflict of interest statement. None declared.

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Recurrent rhabdomyolysis and mild acute renal failure associated with acute Brucella infection

Sir,

Various infectious agents have been reported to cause rhabdomyolysis [1–5]. We present a case of acute Brucella infection, complicated with recurrent rhabdomyolysis and mild renal failure.

A 39-year-old man was admitted to hospital because of muscular pain and dark urine. Ciprofloxacine was begun 1 day before his referral with the possible diagnosis of urinary infection. He reported consumption of unpasteurized milk products 1 month before his admission. Physical examination was normal except for high fever (38.2°C). Abnormal laboratory results were as follows: erythrocyte sedimentation rate 70 mm/h, C-reactive protein 14.0 mg/dl (normal: 0.0–8.0 mg/dl), creatine phosphokinase (CK) 2365 U/l, CK-MB 60 U/l, aspartate aminotransferase (AST) 383 U/l and alanine aminotransferase (ALT) 549 U/l. The standard tube agglutination (STA) test for brucellosis, other serological tests for infectious agents and cultures were negative. Urinalysis revealed dark brown urine with a positive dipstick reaction for blood. Renal ultrasonography was normal. The estimated glomerular filtration rate by the Cockcroft–Gault formula was 90 ml/min and it decreased to 65 ml/min on the second day. On the third day, temperature and most of the biochemical tests returned to normal, and on the fifth day the patient was discharged. Ciprofloxacine was continued for 2 weeks. Twenty days after his discharge, the patient was re-admitted with high fever (39.2°C) and muscular pain (Figure 1). Recomsumption of unpasteurized milk products or other risk factors for brucellosis were not found. Laboratory tests were as follows: CK 1545 U/l, AST 48 U/l, ALT 65 U/l, urea 23 mg/dl and creatinine 1.01 mg/dl. Urinalysis revealed dark brown urine with a positive dipstick reaction for blood. The Brucella

Fig. 1. Time course of serum creatine phosphokinase (CK) and axillary temperature levels.

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STA test was positive at the titre of 1:80, and a Brucella spp. was isolated from blood using a rapid isolation technique (BACTEC) and was identified as B.melitensis with conventional culture techniques. Doxycycline, rifampicin and saline infusion were started. Antibiologic therapy was continued for 6 weeks and the symptoms had disappeared at the end of the treatment. After 3 months of follow up, no relapse was reported.

The most frequent causes of rhabdomyolysis are excessive muscular activity, alcohol, drugs and infections. Commonly implicated infectious agents are Influenza, Legionella and Streptococcus [1–5]. In this case, the diagnosis of rhabdomyolysis was established with appropriate clinical signs: elevated serum CK levels and dark urine with a positive dipstick reaction for blood in the absence of red cells. The main possible causes of rhabdomyolysis were excluded by history and laboratory tests. At first admission, attempts to isolate the infectious agent from blood were unsuccessful, possibly because of ciprofloxacin, which is an adjunctive agent in the treatment of brucellosis [5,6]. Blood cultures are positive in 15–70% of patients with brucellosis; and rapid isolation techniques are also reported to be satisfactory for recovering Brucella. A Brucella STA titre of $\geq 1:160$ or a 4-fold rise in titre is considered positive for diagnosis [5]. In the index case, the low titre might have been due to early treatment with ciprofloxacin. Two weeks of ciprofloxacin is not enough for the complete therapy of brucellosis [5,6]. Cessation of ciprofloxacin for 12 days between the two admissions might be the reason for the reappearance of clinical and laboratory abnormalities. Only one case of Brucella infection-induced rhabdomyolysis accompanied by acute renal failure has been described in English literature [1]. Although the effect of inflammatory cytokines and the direct toxic effect of infectious agents on the muscle tissue are the possible mechanisms of rhabdomyolysis in other infections, the mechanism of rhabdomyolysis in brucellosis is unknown [1–4]. The different presentation of this case was recurrent rhabdomyolysis. No such case was found in the literature.

In conclusion, acute Brucella infection should be considered in the differential diagnosis of rhabdomyolysis, particularly in those areas where brucellosis is endemic.

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Acute renal failure following intravesical bacille Calmette–Guérin chemotherapy for superficial carcinoma of the bladder

Sir,

Intravesical chemotherapy with bacille Calmette-Guérin (BCG) is an effective treatment for superficial transitional cell carcinoma of the bladder, but is not without side effects. This case highlights two rare complications that may present to the nephrologist—interstitial nephritis and glomerulonephritis.

A 72-year-old man was diagnosed with bladder carcinoma \textit{in situ} in June 2003 and underwent trans-urethral resection of the tumour followed by a 6 week course of intravesical BCG chemotherapy (TICE strain). Further courses of three doses were administered in January and July 2004. The last catheterization was traumatic and, following chemotherapy, the patient became specifically unwell and confused. He was treated with cephalaxin and then ciprofloxacin for presumed urinary tract infection, with no improvement. Two weeks later, he was re-admitted with acute renal impairment—blood urea 18.6 mmol/l and serum creatinine 258 μmol/l (92 μmol/l previously). Liver function tests were mildly abnormal, urine culture negative and renal ultrasonography normal. He continued to deteriorate and was transferred to our centre with a serum creatinine of 558 μmol/l. Renal biopsy revealed acute tubulointerstitial nephritis (no granuloma). Thirty percent of glomeruli were abnormal, with focal segmental mesangial proliferation but no necrosis. Stains for acid-fast bacilli and immunofluorescence were negative and electron microscopy was unremarkable.

Prednisolone, isoniazid and rifampicin were commenced and his renal function improved, liver function tests normalized and other symptoms resolved. By 3 months after commencing treatment, his creatinine had fallen to 174 μmol/l. Urinalysis demonstrates persistent trace proteinuria and 2+ haematuria.

Intravesical BCG has been used in the treatment of bladder cancer for 20 years. Common side effects are transient phenomena—cystitis and dysuria (in 80% of patients), haematuria (40%) and low-grade pyrexia (30%) [1]. Significant adverse effects occur in 1%, ranging from local pathology such as granulomatous prostatitis to disseminated BCG infection with hepatitis, pneumonitis, mycotic aneurysms and retroperitoneal abscesses. BCG ‘itis’ is a severe systemic illness occurring immediately following treatment and resembling Gram-negative sepsis [2,3].

Specific renal lesions, tubulointerstitial nephritis (often with epithelioid granuloma formation) and mesangial glomerulonephritis, have been reported [4,5]. Spread of the bacterium (or mycobacterial proteins) is thought to be haematogenous, hence traumatic instrumentation of the urinary tract, allowing access to the circulation, is a risk factor for the serious manifestations. A dose-dependent