CASE REPORT

Rhabdomyolysis associated with *Mycoplasma pneumoniae* pneumonia

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We report a case of rhabdomyolysis associated with *Mycoplasma pneumoniae* pneumonia in a 37-year-old Sri Lankan man who presented to the emergency department with complaints of feverishness, shortness of breath, cough, and generalised muscle pain. He had a serum creatinine kinase of 14 220 U/L, serum myoglobin of 1822 ng/mL, and serum creatinine of 195 μmol/L. His chest X-ray revealed bibasilar interstitial infiltrates. The antimycoplasma antibody titre was high. The patient was successfully treated with aggressive intravenous fluid replacement and azithromycin. The outcome was rapidly favourable, allowing us to discharge the patient 12 days after admission. On discharge, the serum creatinine kinase was 924 U/L and the creatinine was 126 μmol/L; the chest examination was unremarkable.

Introduction

Mycoplasma pneumoniae is one of the few *Mycoplasma* species that causes human disease.[1] Most *M pneumoniae* infections are confined to the respiratory tract, and approximately 3 to 10% of patients develop clinical pneumonia.[2,3] However, about 25% of patients with *M pneumoniae* infections also have various extrapulmonary manifestations. The latter involve the central nervous, cardiovascular, gastro-intestinal, haematological and myo-articular systems; and may present before, during, after, or in the absence of pulmonary signs.[4] Rhabdomyolysis is a rare complication of *M pneumoniae* respiratory infections. In this report, we present a case of *M pneumoniae* pneumonia complicated by rhabdomyolysis and acute renal failure in a previously healthy young man. This case emphasises the importance of monitoring creatinine kinase (CK) levels in patients with *M pneumoniae* infection for early detection of rhabdomyolysis, which may lead to acute renal failure and other life-threatening rhabdomyolysis-related complications.

Case report

In January 2010, a 37-year-old Sri Lankan man presented to the emergency department with complaints of feverishness, shortness of breath, cough, and generalised muscle pain. His symptoms started 2 weeks before his presentation to the emergency department with feeling of feverish and a dry cough, which latterly became wet. The patient took paracetamol tablets, but did not seek for any other health assistance. Ten days later he developed generalised muscle pain and weakness. The patient had previously been well, and his family history was unremarkable. On examination, he appeared ill, dyspnoeic, and febrile but was conscious and well-oriented. His pulse rate was 119 beats/min, the blood pressure was 100/60 mm Hg, the respiratory rate was 35 breaths/min, and his temperature was 38.6°C. Chest examination yielded bilateral crepitations. The rest of his examination was unremarkable, and on room air his oxygen saturation was 90%.

Initial investigation showed a leukocyte count of 10 000 /μL, a haemoglobin level of 160 g/L, and a platelet count of 450 000 /μL. Arterial blood gas analysis with the patient on 4-litre oxygen/min via a nasal cannula was as follows: pH 7.49, PaO_2 85 mm Hg, $PaCO_2$ 25 mm Hg, and bicarbonate 21 mmol/L. The values of blood urea nitrogen was 5.2 mmol/L, serum creatinine 195 μmol/L, aspartate aminotransferase 290 U/L, alanine aminotransferase 112 U/L, CK 14 220 U/L, and serum myoglobin of 1822 ng/mL, whereas coagulation parameters were within normal limits. A malaria parasite smear was negative and urine dipstick and microscopy were normal. The chest X-ray revealed bibasilar interstitial infiltrates, and the electrocardiogram showed a sinus tachycardia. Infection with seasonal influenza A virus and pandemic influenza A (H1N1) virus had been excluded.

Blood and sputum samples were sent to the laboratory for culture and sensitivity testing. Abdominal ultrasound showed normal-sized, unobstructed kidneys with increased cortical echogenicity.

The patient was diagnosed with rhabdomyolysis and renal impairment associated with community-acquired pneumonia. Intravenous (IV) ceftriaxone and azithromycin

Key words
Mycoplasma pneumoniae; Pneumonia, mycoplasma; Rhabdomyolysis

Hong Kong Med J 2012;18:247-9

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與肺炎支原體肺炎有關的橫紋肌溶解症

本文報告一宗與肺炎支原體肺炎有關的橫紋肌溶解症。一名37歲斯里蘭卡籍男性送往急症室時出現發燒、氣短、咳嗽及全身肌肉疼痛。他的血清肌酸激酶水平為14 220 U/L、血清肌紅蛋白水平1822 ng/mL、及血清肌酸酐水平195 μmol/L。其胸部X光顯示兩側肺底有組織浸潤。抗肺炎支原體抗體效價測定值高。為病人靜脈注射補充流失的體液及阿奇霉素療效迅速，住院12天後出院。出院時病人的血清肌酸激酶水平為924 U/L及血清肌酸酐126 μmol/L。胸部X光正常。

were started empirically, together with vigorous IV fluid replacement. The patient was admitted while septic workup and other tests were pending. Subsequently, the following studies were obtained—tests for human immunodeficiency virus; hepatitis A, B, and C; and cytomegalovirus were negative, as were the Widal test and serology for *Brucella*; antinuclear antibody was negative while anti-streptolysin O titre and complement components C3, C4 were normal; blood culture was negative and sputum cultures showed normal bacterial flora.

Over the following days, the fever subsided and breathlessness progressively improved. Azithromycin was discontinued after 5 days. Enzyme-linked immunosorbent assay showed an *M pneumoniae* immunoglobulin M (IgM) antibody titre of 1440 mU/mL (reference level, <330 mU/mL). The patient was diagnosed as having rhabdomyolysis associated with *M pneumoniae* pneumonia, and ceftriaxone was discontinued. The outcome was rapidly favourable, and the patient was discharged 12 days after admission, at which time his serum CK level was 924 U/L and serum creatinine level was 126 μmol/L, whilst chest examination was unremarkable.

Discussion

Rhabdomyolysis involves the breakdown of skeletal muscle causing myoglobin and other intracellular proteins and electrolytes to leak into the circulation. The aetiological spectrum of this syndrome is extensive and includes toxins and medications (eg statins and recreational drugs), trauma, excessive muscular activity, excess heat, and muscle ischaemia.[5] Other causes include electrolytes disturbance, endocrine abnormalities, hereditary metabolic abnormalities or structural abnormalities of skeletal muscle cells, connective tissue disorders, and infections. It is a rare complication of *M pneumoniae* infection. A MEDLINE search showed that only seven such cases had been reported in the literature.[6-12] We think that the scarcity of such reports is probably due to under-reporting, because the clinical picture of rhabdomyolysis can be missed—muscular pain, passage of tea-coloured urine, and muscle swelling and tenderness may not be prominent and could even be absent. The Table[6-12] shows the characteristics of some of the reported cases of rhabdomyolysis associated with *M pneumoniae* infection.

Serum levels of CK are a hallmark of rhabdomyolysis; a serum CK level greater than 5 times the normal value (in the absence of heart or brain diseases) is enough to establish the diagnosis.[5] On the other hand, the diagnosis of mycoplasma infection usually depends on serological tests or polymerase chain reaction gene amplification techniques, as the organism is fastidious and difficult to culture. In our patient, the diagnoses of *M pneumoniae* pneumonia and rhabdomyolysis were based on the high anti-mycoplasma IgM antibody titre and elevated CK level (>5 times the normal value).

In our case, rhabdomyolysis was attributed to *M pneumoniae* pneumonia, as other causes such as toxins and medications, trauma, excessive muscular activity, muscle ischaemia, electrolytes disturbance, endocrine abnormalities, connective tissue disorders, and other infections were excluded based on laboratory and clinical data.

The pathogenesis of rhabdomyolysis in patients with *M pneumonia* infection is not completely understood. Proposed mechanisms include immune-mediated reactions, myotoxin-mediated muscle damage and/or invasion of affected muscles by the organism.[10]

Although rare, acute renal impairment in the setting of *M pneumoniae* infection has been described, which is most probably due to rhabdomyolysis.[6-12] Other possible causes of renal failure include glomerulonephritis, interstitial nephritis, and nephrotic syndrome.[13-15] Although we did not perform a renal biopsy, normal complement levels, the absence of nephrotic syndrome, as well as rapid resolution of symptoms without dialysis suggested rhabdomyolysis as the major contributor. As noted in the Table, five (63%) patients developed renal impairment, three of whom had at least one dialysis session to treat renal failure. The prognosis of myoglobinuric renal failure associated with *M pneumoniae* infection is probably good (Table); only one patient died due to an infection-related complication.[9]

For our patient, isolation of *Mycoplasma* by polymerase chain reaction or culture was not undertaken. The diagnosis was based on the high mycoplasma antibody (IgM) titre in the serum and prompt response to anti-mycoplasma antimicrobial treatment.

In conclusion, rhabdomyolysis is a rare but serious complication of *M pneumoniae* infection. A high index of suspicion is required as the clinical manifestations may be non-specific. It is therefore necessary to monitor CK level in patients with *M pneumoniae* infection who present with non-specific clinical pictures such as muscle pain and unexplained renal impairment.

TABLE. Characteristics of reported cases of rhabdomyolysis associated with *Mycoplasma pneumoniae* infection*[6-12]

Report	Sex/ age (years)	Respiratory syndrome	Extrapulmonary manifestation	Diagnostic tools	Creatinine kinase level (U/L)	Therapy	Complications / outcome
Rothstein and Kenney[6]	F/28	Pneumonia	Rhabdomyolysis, transverse myelitis, polyneuritis, optic neuritis	*M pneumoniae*, AT	>40 000	Methylprednisolone	No / good
Decaux et al[7]	M/60	None	Rhabdomyolysis, CNS complications, akinetic mutism, left hemiparesis	*M pneumoniae*, AT	2900	VA, haemodialysis	Renal impairment, respiratory failure due to muscle weakness / good
Berger and Wadowksy[8]	F/15	Pneumonia	Rhabdomyolysis	*M pneumoniae*, AT, PCR, sputum culture	1 074 240	Antibiotics, IV fluid	Renal impairment / good
Daxböck et al[9]	M/55	Pneumonia	Rhabdomyolysis, Stevens-Johnson syndrome, pancreatitis, anaemia, reactive arthritis	*M pneumoniae*, AT, PCR	792	VA, antibiotics, haemofiltration, lung transplantation	Renal impairment, necrotising pneumonia, post-transplant intrapulmonary haemorrhage / died
Minami et al[10]	M/4	Pneumonia	Rhabdomyolysis	*M pneumoniae*, AT	142 459	Antibiotics, VA, IV fluid	Respiratory failure / good
Gupta et al[11]	F/25	Interstitial pneumonitis	Rhabdomyolysis, Guillain-Barré syndrome	*M pneumoniae*, AT	77 700	Antibiotics, VA, peritoneal dialysis	Renal impairment, respiratory failure / good
Weng et al[12]	M/4	None	Rhabdomyolysis, transverse myelitis	*M pneumoniae*, AT	15 855	IV immunoglobulin, IV fluid, alkalisation, and mannitol	No / good
Khan and Sayed (present case)	M/37	Pneumonia	Rhabdomyolysis	*M pneumoniae*, AT	14 220	Antibiotics, IV fluid	Renal impairment / good

* AT denotes antibody titres, CNS central nervous system, IV intravenous, PCR polymerase chain reaction, and VA ventilatory assistance

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