〈Case Report〉

A case of myasthenia gravis in which the interval to repeated exacerbation was prolonged by L-carnitine

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ABSTRACT We report the case of a 62-year-old woman diagnosed with myasthenia gravis. She felt dyspnea and weakness of bilateral upper limbs, followed by left blepharoptosis. Pyridostigmine markedly improved her symptoms. But later, blepharoptosis and head drop worsened and predonisolone was ineffective. Yet, after intravenous immunoglobulin therapy her symptoms markedly improved. However, her head drop worsened at intervals of 25.79 days on average. She was administered L-carnitine, and the interval until exacerbation became longer (40.67 days on average). This case is interesting because L-carnitine therapy has never been reported as therapy for myasthenia gravis. doi：10.11482/KMJ-E43(1)1 *(Accepted on December 24, 2016)*

Key words：Myasthenia gravis, L-carnitine

INTRODUCTION

In myasthenia gravis, neuromuscular transmission is impaired by auto-antibodies against the acetylcholine receptors localized in the synaptic membrane of the neuromuscular junction[1－3]. Clinical features include weakness and fatigability of skeletal muscles. We report the case of a patient with myasthenia gravis who did not respond to therapy with steroids, achieved remission after treatment with immunoglobulin, but suffered repeated episodes of remission and exacerbation. However, L-carnitine prolonged the interval between the exacerbation episodes in this patient.

CASE REPORT

The patient, a 62-year-old woman, noted weakness of the upper limbs; then she started feeling shortness of breath and was subjected to several tests, including blood tests, chest x-ray, and ECG, all of which showed no abnormalities. The patient presented 5 days after onset of left blepharoptosis, which worsened when she was tired. Besides, when she raised her arms, she complained of languor. She visited our hospital again, and tensilon test was positive for myasthenia gravis. Thus, she was admitted on the same day. On admission, her neurological signs were bilateral blepharoptosis, and left external strabismus. Eye movements were normal. Bilateral large pectoral muscles and deltoid muscles revealed mild weakness. Muscle strength of lower extremities was normal. A blood test showed 97,000 platelets / μL, and anti-acetylcholine

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receptor antibodies were 32 nmol/L (normally 0～0.2). The chest magnetic resonance imaging (MRI) was negative for a thymoma or thymic hyperplasia. Repetitive stimulation test showed no obvious waning. She was diagnosed with myasthenia gravis (myasthenia gravis foundation of America (MGFA) Ⅱa, myasthenia gravis-activities of daily living (MG-ADL) scale 3). The patient was administered pyridostigmine, and as her symptoms improved markedly she was discharged from hospital. Nevertheless, 2 weeks later she complained of head drop, bilateral blepharoptosis, and oppressive feeling of posterior neck; she was started on prednisolone. But her symptoms showed no improvement. Because 199 days after onset she still had bilateral blepharoptosis, and head drop all day long, she was admitted to our hospital. Although steroid pulse therapy (methylprednisolone 1,000mg/day ×3 days) was provided, her symptoms worsened (Fig.1A). High-dose intravenous immunoglobulin therapy was started (400 mg / kg / day×5 days). Her symptoms showed a remarkable improvement and she was discharged from hospital. Thereafter, while under high-dose intravenous immunoglobulin therapy, she attended our hospital every 19-36 days due to worsening of head drop (25.79 days on average). She was started on L-carnitine 1,500 mg/day on Day 805 after onset, but no prolongation of the interval between the episodes of remission and exacerbation was observed. The dose of L-carnitine was increased to 1,750 mg/day on Day 834, which prolonged the interval until exacerbation to 39-42 days (40.67 days on average) (Fig.1B). The patient reported a great improvement of her quality of life. Serum concentrations of carnitine before L-carnitine administration were 59.9 μmol / L for total carnitine (standard value 45-91), 47.0 μmol / L for free carnitine (standard value 36-74), and 12.9 μmol/L for acylcarnitine (standard value 6-23). They were all within standard range. Serum anti-acetylcholine receptor antibodies were 34 nmol/L on Day 874 and 26 nmol/L on Day 958.

DISCUSSION

Carnitine was first found in muscle tissue in 1905, but its physiological role was unclear for many years. Studies reported in the 1950s showed that L-carnitine played important roles in fatty acid β-oxidation via transportation of long-chain fatty acids into the mitochondrial matrix and in the control of the mitochondrial acyl coenzyme A (CoA) /CoA ratio, which is important for energy metabolism in the cells[4]. Oyanagi *et al.* found that mitochondrial membrane fatty acid stress was suppressed by the coexistence of L-carnitine[5].

Mariano *et al.* tried to administer L-carnitine to centenarians with onset of fatigue after even slight physical activity. They reported that oral administration of L-carnitine produced a reduction of total fat mass, increased total muscular mass, and facilitated an increased capacity for physical and cognitive activity by reducing fatigue and improving cognitive functions[6]. Eric *et al.* reported that intravenous L-carnitine reduced fatigue, and might preserve exercise capacity in hemodialysis patients[7].

As for neurological disorders, there was the case of a patient with multiple sclerosis in whom L-carnitine was effective. Lebrun *et al.* reported that the degree of fatigue decreased in 63% of their patients with multiple sclerosis and immunosuppressive therapy-induced fatigue, after treatment with L-carnitine[8]. Because of this report, we tried to administer L-carnitine to our patient. A major symptom of myasthenia gravis is easy muscle fatigability. The increased L-carnitine pool achieved in skeletal muscle in our patient probably resulted in increased energy metabolism in the mitochondria of muscle cells and a longer interval between remission and exacerbation, suggesting decreased muscle fatigue. Our case is interesting because L-carnitine therapy has never been reported as therapy for

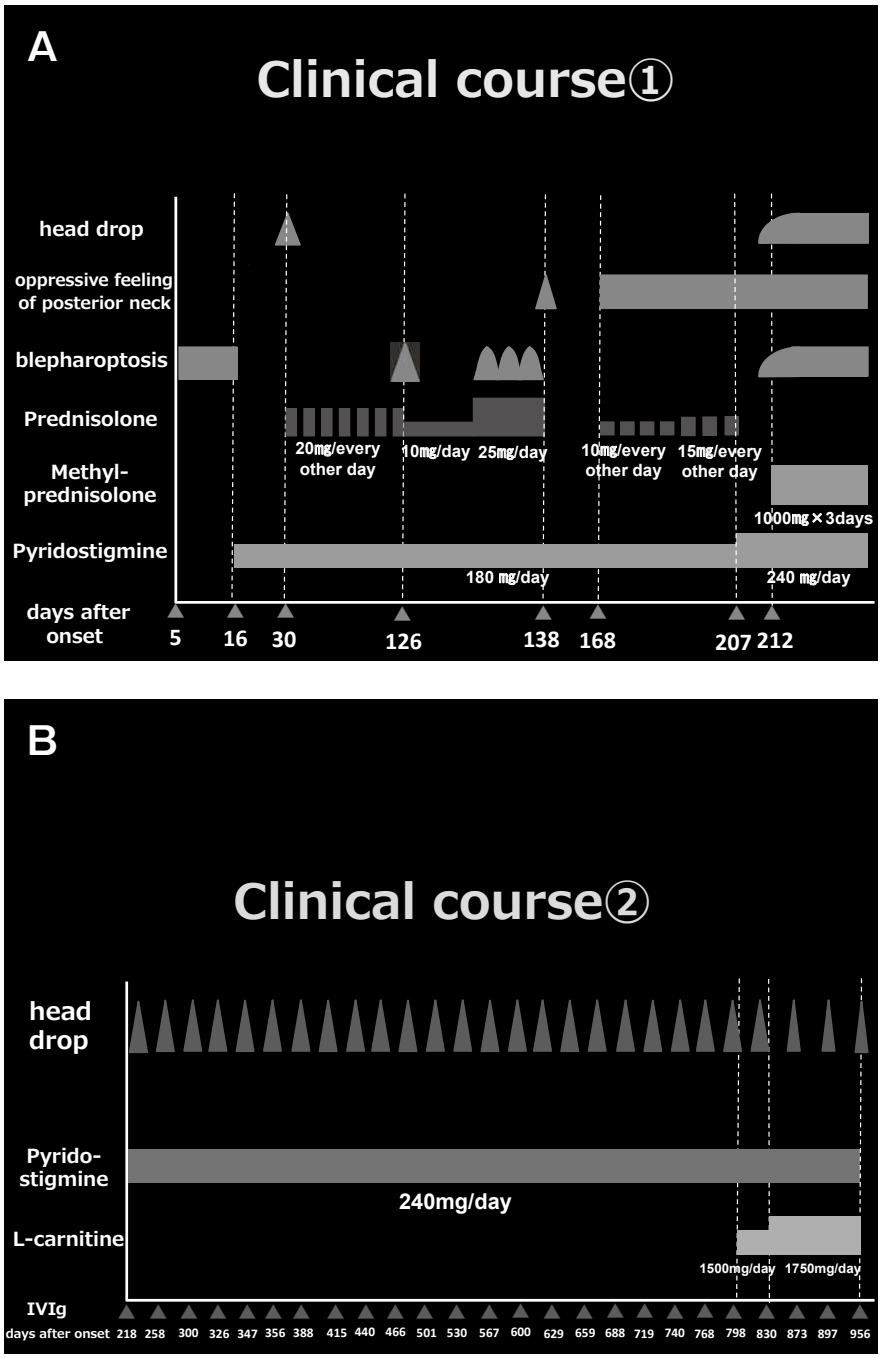

Fig. 1. Clinical course

A. From onset to before high-dose intravenous immunoglobulin therapy.

B. After high-dose intravenous immunoglobulin therapy(IVIg) and L-carnitine administration. While under high-dose intravenous immunoglobulin therapy, the patient attended our hospital every 19-36 days due to worsening of head drop (25.79 days on average). She was started on L-carnitine 1,500 mg/day on Day 805 after onset, but no prolongation of the interval between the episodes of remission and exacerbation was observed. The dose of L-carnitine was increased to 1,750 mg/day on Day 834, which prolonged the interval until exacerbation to 39-42 days (40.67 days on average) .

myasthenia gravis.

ACKNOWLEDGEMENTS

The authors declare no conflict of interest.

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