Facial Muscular Atrophy in a Myasthenia Gravis Patient

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Abstract

A 56-year-old man with anti-acetylcholine receptor antibody-mediated myasthenia gravis had bilateral facial muscular atrophy and had noticed blepharoptosis 15 years earlier. From 45 to 51 years of age, 5-10 mg prednisolone and 180 mg pyridostigmine daily relieved his symptoms. Subsequently, these treatments no longer improved the facial weakness, though blepharoptosis was absent. At 56 years of age, the edrophonium test and repetitive supramaximal stimulation testing of the orbicularis oris were negative. Frontalis muscle needle electromyography showed low amplitude polyphasic units and an incomplete interference pattern. Facial muscle atrophy, caused by disuse atrophy from neuromuscular junction depletion, contributed to this patient’s facial weakness.

Key words: myasthenia gravis, facial weakness, muscular atrophy


Introduction

More than 30 years ago, before patients with myasthenia gravis (MG) were treated with thymectomy and high-dose prednisolone (PSL), localized muscular atrophy was detectable in 5-10% of MG patients (1, 2). In these cases, the facial muscles were relatively rarely involved (2-4). Since then, the number of papers dealing with muscle atrophy in MG patients has decreased significantly. However, muscular atrophy, especially that involving the tongue and facial muscles, has been recently reported in MG patients with anti-muscle-specific tyrosine kinase (MuSK) antibodies (5-8). The case of an ACh-R antibody-mediated MG patient with facial muscular atrophy after long-term, low-dose PSL treatment without thymectomy is reported.

Case Report

A Japanese man was well until the age of 40 years, when he noticed blepharoptosis. At the age of 45 years, he also noticed difficulty closing his mouth and was admitted to the internal medicine department of our hospital. He showed bilateral blepharoptosis, associated with mild weakness of bilateral facial muscles. The edrophonium test and repetitive supramaximal stimulation testing (RSST) of the orbicularis oris were negative. The patient’s symptoms were relieved by treatment with 5 mg PSL and 180 mg pyridostigmine daily. At the age of 51 years, the patient noticed dyarthria and dysphasia, associated with bilateral facial weakness. The PSL dose was increased to 10 mg daily, with relief of his symptoms. One year later, he complained of difficulty in closing his eyes and mouth, and he was admitted to the internal medicine department of our hospital. Neurological examination revealed blepharoptosis and bilateral facial weakness. There was no waning on RSST of the orbicularis oris. The serum anti ACh-R antibody titer was elevated to 12.0 nmol/L. Although treatment with 20 mg PSL and 180 mg pyridostigmine daily relieved his blepharoptosis, facial weakness remained.

At the age of 56 years, his neurological findings remained. He showed bilateral facial muscular weakness and the Bell phenomenon during attempted eye-closure (Fig. 1-A), and lack of frontal wrinkles. There was no ptosis (Fig. 1-B) or ophthalmoplegia. Upward and downward gaze repeated 50 times did not induce blepharoptosis. Examination of the tongue revealed normal taste sensation and neither tongue atrophy nor fasciculation. He had no dysarthria.
or dysphasia. No muscular weakness or sensory impairment was noted in his limbs. The deep tendon reflexes were normal. Babinski’s sign was absent. The edrophonium test was negative. The serum anti ACh-R antibody titer was 23.2 nmol/L. A chest CT scan showed no thymoma. The nerve conduction studies of the facial nerves were within normal limits. Elicitation of the blink reflexes of bilateral facial nerves was normal. No waning was obtained on RSST of the orbicularis oris. Needle electromyography (EMG) of the frontalis muscle showed the presence of low or normal amplitude (151.0-470.0 μV) and polyphasic (3-5 phases) units (Fig. 2-A and B), associated with an incomplete interference pattern (Fig. 2-C). There were no fibrillation potentials, positive sharp waves, or fasciculation potentials. The Myasthenia Gravis Foundation of America clinical classification was IIb, and the quantitative MG score was 3 points.

**Discussion**

This patient was diagnosed as having ACh-R antibody-mediated MG because his serum ACh-R antibody titer was elevated and his blepharoptosis and orbicularis oris weakness improved with combination treatment that included oral corticosteroid and a cholinesterase inhibitor. One of the most characteristic findings in this patient was the presence of bilateral facial muscular weakness. At the early stage of his disease, at 45 years of age, treatment with low-dose PSL and a cholinesterase inhibitor was effective in relieving not only the blepharoptosis but also the facial muscular weakness. Therefore, the facial muscular weakness could have been caused by acetylcholine depletion at the neuromuscular junction at that point. Since the age of 52 years, treatment with oral PSL and cholinesterase inhibitor did not improve his facial muscular weakness, though he no longer had blepharoptosis. The edrophonium test was negative, and no waning was observed on RSST. The nerve conduction study findings and the elicitation of blink reflexes ruled out the presence of facial nerve neuropathies. An EMG of the frontalis muscle demonstrated low amplitude polyphasic units with an incomplete interference pattern. These findings showed muscular atrophy. Therefore, it was concluded that facial muscle atrophy contributed to this patient’s facial weakness.

More than 30 years ago, before thymectomy and high-dose PSL were established as treatments for MG, there were relatively many papers dealing with muscle atrophy associated with MG. Localized muscular atrophy is detectable in 5-10% of MG patients (1, 2). In such cases, muscular atrophy usually involves the tongue, the scapulohumeral muscles, or the proximal limb muscles; facial muscular atrophy is relatively rare (2, 3, 9, 10). Oosterhuis and Bethelm (3) reported the pathological findings of biopsied atrophic muscles of 10 MG patients: 8 showed neurogenic changes with or without lymphocytic infiltration; 1 showed lymphocytic infiltration only; and 1 showed type II-fiber atrophy. They suggested that the muscular atrophy could be caused by denervation resulting from chronic acetylcholine depletion at the involved motor end-plates. Both pathologically and physiologically, the atrophied muscles of MG patients primarily showed neurogenic changes (3, 4).

In MG patients with anti-MuSK antibodies, relatively specific atrophy of the tongue and facial muscles has been reported (5, 6). In general, muscular atrophy of the tongue
and facial muscles in MuSK-associated MG is more severe than that in ACh-R-associated MG (5). Several theories for the mechanism of muscular atrophy in the tongue and facial muscles in MuSK-associated MG patients have been suggested, including: disuse atrophy due to neuromuscular transmission failure (1); anti-MuSK antibody-mediated myopathic changes (7); and long-term steroid treatment-induced myopathic changes (5, 8). Recent studies demonstrated the presence of myopathic muscular atrophy in the tongue and facial muscles even in patients with ACh-R antibody-mediated MG treated with relatively high-dose PSL (5).

Taking into account the previously reported papers discussed above, two possible mechanisms of facial muscular atrophy in the present patient should be considered: disuse atrophy due to neuromuscular junction conduction block; and myopathic changes due to long-term steroid treatment. However, disuse atrophy seems likely because this patient had been treated with low-dose PSL (5-10 mg daily) for a long time (7 years) before the onset of facial atrophy.

References