A Case Report of Congenital Fiber Type Disproportion with an Increased Level of Anti-AChR Receptor Antibodies

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Congenital fiber type disproportion (CFTD) is a form of congenital myopathy, which is defined by type 1 myofibers that are 12% smaller than type 2 myofibers, as well as a general predominance of type 1 myofibers. Conversely, myasthenia gravis (MG) is an acquired immune-mediated disease, in which the acetylcholine receptor (AChR) of the neuromuscular junction is blocked by antibodies. Thus, the anti-AChR antibody is nearly specific to MG. Herein, we report on a case of CFTD with increased anti-AChR antibody levels. A 23-month-old boy exhibited muscle hypotonia and weakness. Although he could walk by himself, he easily fell down and could not control his head for a long time. His blood test was positive for the anti-AChR antibody, while a muscle biopsy revealed characteristics of CFTD. We could not explain the relationship between MG and CFTD. However, we considered different diagnoses aside from MG, even when the patient’s blood is positive for the anti-AChR antibody.

2. Case Report

The male patient was born after 38 weeks and 3 days of gestation with a birth weight of 2350 g. Although the patient had a twin in utero, the sibling died before birth. The patient had a short stature and failed to gain weight. He could walk by himself at an age of 11 months, without the developmental step of crawling.
At the last examination, the patient was 23 months old, with a body height of 77.7 cm (−2.1SD) and a weight of 8.4 kg (−2.2SD). He easily fell down and had hypotonia and muscle weakness of the whole body. Muscle weakness of the neck was very apparent, with the patient having great difficulty supporting his head for a long time. The severity of muscle weakness did not show a daily variation. The patient did not have ptosis, ophthalmoplegia, a nasally voice, or difficulty in biting hard on food but did present with a high-arched palate. The Tensilon test showed the muscle weakness was not changed. His brain MRI, chest X-ray, and nerve conduction velocity were normal. Additionally, the EMG did not reveal a neurogenic and myogenic pattern, and an evoked EMG did not show waning, a common finding among MG cases. His levels of creatine kinase (80 U/l; normal range, 67–284) were normal. His levels of anti-AChR antibodies were high (1.0 nmol/L; normal range, <0.1), while his levels of antimuscle-specific tyrosine kinase (anti-MuSK) antibodies were normal (0.005 nmol/L; normal range, <0.05). The anti-AChR antibody was reexamined and remained high. Thus, due to the increased levels of anti-AChR antibodies, we made a diagnosis of GMG.

The patient was administered 5 mg/kg of pyridostigmine every day and 2 mg/kg of oral prednisolone every other day. However, the treatment led to no response. During the pulse therapy, anti-AChR antibody changed from positive to negative.

A muscle biopsy was performed to decide a proper diagnosis. Hematoxylin and eosin stains showed clear variations in myofiber size (Figure 1(a)). ATPase stain revealed type 1 fibers that were 12% smaller than type 2 fibers (Figure 1(b)). However, fiber type 1 predominance was not observed, as type 1 fiber accounted for 50.8% of all fibers (Figures 1(b), 1(c), and 1(d)). However, the proportion of the type 1 fiber showed a trend for being higher, because the ratio of type 1 to 2 myofibers was 1 to 2. As illustrated in Figure 1(c), there was a deficiency in type 2B fibers; a finding sometimes observed in CFTD. NADH-TR staining and other stains confirmed the absence of other congenital myopathies, such as NM, CNM, and inflammatory changes. These findings coincided with a diagnosis of CFTD.

### 3. Discussion

Somnier previously analyzed the differences in anti-AChR antibodies between healthy controls and patients with MG [7]. Using a 0.5 nmole/L, anti-AChR antibody cutoff, the finding was 99% specific to MG. Therefore, the anti-AChR antibody of our patient was clearly elevated. However, the level decreased to normal during steroid pulse therapy. The muscle weakness of the patient and elevated anti-AChR antibodies were suspected to indicate GMG. Although
the patient had muscle weakness, he did not have findings typical of MG, including a waning of EMG, tensilon test, and daily variations in muscle weakness.

The anti-AChR antibody was detected in patients with muscular disorders, facioscapulohumeral muscular dystrophy, myotonic dystrophy, and mitochondrial myopathies [8]. Some of the patients improved with immunosuppression. In addition, the positives with the anti-AChR antibody have been previously reported in Down’s syndrome cases [9, 10]. Interestingly, patients with Down’s syndrome also exhibit muscle hypotonia.

On the other hand, the muscle biopsy of our patient revealed findings indicative of CFTD, although the gene mutation was not decided.

To the best of our knowledge, the relationship between CFTD and MG has not yet been reported. However, the possibility that the anti-AChR antibody induced CFTD still remains unknown.

Therefore, even if a patient is positive for the anti-AChR antibody, diseases other than MG, which also demonstrate muscle hypotonia, should be considered.

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