Finger Flexor Weakness in Myasthenia Gravis

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ABSTRACT

Myasthenia gravis (MG) affects the ocular, bulbar, and proximal limb muscles. The involvement of distal limb muscles is uncommon. MG-related weakness that severely affects the finger flexors and spares finger extensors and intrinsic hand muscles have never been reported. Here, we report a 35-year-old woman with acetylcholine receptor-antibody positive generalised MG who presented with severe bilateral asymmetric (left worse than right) finger flexor weakness during an MG relapse. The remaining muscles including the median and ulnar intrinsic hand muscles were normal. Repetitive nerve stimulation test showed decremental responses of more than 10%. Magnetic resonance imaging showed short-T1 inversion recovery sequences and increased signal intensities in the volar forearm muscles. Needle electromyography revealed fibrillations and positive sharp waves, small amplitude, short-duration, and polyphasic early recruiting motor unit action potentials. Myositis-specific autoantibodies were negative. Muscle biopsy showed neurogenic features. The patient had a good recovery with immunotherapy. We conclude that clinicians should be aware that marked weakness of the finger flexors can occur as a result of an MG relapse and may require early aggressive therapy.

Key Words: *Electromyography, Finger flexors, Muscle, Biopsy, Myasthenia gravis.*

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INTRODUCTION

Myasthenia gravis (MG) is an autoimmune disease that typically affects the ocular, bulbar, and proximal limb muscles. The vast majority of MG patients have antibodies against acetylcholine receptors (AChR). A minority have either muscle-specific tyrosine kinase antibodies or are seronegative. Although MG-related weakness commonly involves proximal muscles, weakness affecting the wrist and finger extensors, and ankle dorsiflexors can occur in some patients. It is not entirely understood why certain muscle groups have increased vulnerability to weakness, while other muscle groups remain unaffected.[1] To our knowledge, selective weakness of finger flexors that spares finger extensors and intrinsic hand muscles has never been reported in MG. Here, we present the case of a patient with MG who developed a relapse manifesting with severe weakness of the finger flexor muscles and responded well to immunotherapy.

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CASE REPORT

A 35-year-old woman had been diagnosed with AChR-antibody positive generalised MG for 6 years. Thymectomy revealed thymic hyperplasia. After a period of pharmacological remission, the patient presented with fatigable ptosis, dysarthria, dysphagia, dyspnea, and a new complaint of an inability to make a fist with both hands (more marked on the left side) for the past 6 months. She had stopped all MG medications against medical advice 6 months before symptom onset. She had no neck pain, radicular symptoms, lower limb weakness, sensory symptoms, skin rash, or joint pain. Family history was unremarkable for any inherited neurological disease or MG. Her symptoms improved with intravenous immunoglobulin (IVIG) therapy that she had received at another hospital, but hand weakness persisted. She was subsequently referred to our hospital.

The neurological examination performed at our centre revealed a Medical Research Council (MRC) score of 0/5 of the distal and proximal phalanges of all fingers on the left and a score of 3/5 on the right. The remaining median and ulnar intrinsic hand muscles were normal. Reflexes and sensory examinations were normal.

AChR antibodies were tested again at our centre and revealed high levels of binding, blocking, and modulating antibodies. Electrodiagnostic studies (EDX) were performed 6 months after symptom recurrence. Nerve conduction studies were normal. Repetitive nerve stimulation at 3 Hz revealed a decrement of 15% recorded from the trapezius muscle. Needle electromyography (EMG) of the left and right flexor pollicis longus (FPL), flexor digitorum profundus (FDP), and flexor digitorum sublimis (FDS)

showed fibrillation potentials and positive sharp waves, polyphasic motor unit potentials of decreased amplitude and duration, and early recruitment, which were more severe on the left side. The other sampled muscles were normal, including the left deltoid, extensor indicis proprius, and first dorsal interosseous. The features of the EDX were consistent with an irritative myopathy. Magnetic resonance imaging (MRI) of the left forearm revealed a hyperintense signal on the short-T1 inversion recovery sequences involving the muscles of the volar compartment and extensor carpi radialis (ECR) (Figure 1). MRI of the shoulder girdle muscles and cervical spine was normal. Left FDS muscle biopsy (Figure 2) demonstrated marked fibre size variation, many atrophic fibres, focal endomysial fibrosis, necrotic fibres, fibre grouping, grouped atrophy, and frequent targetoid fibres. The presence of fibre type grouping, grouped atrophy, and targetoid fibres was consistent with a neurogenic process. Laboratory tests including creatinine kinase, vasculitis screening, and myositis-specific autoantibodies were negative.

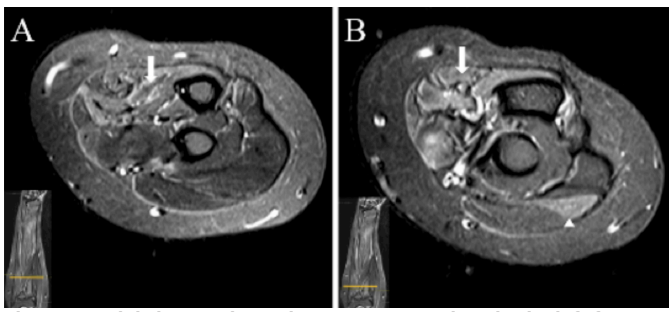

Figure 1: Axial short T1 inversion recovery sections in the left forearm showing muscle edema of the volar compartment (arrow) (A and B) and the extensor carpi radialis (arrow head) (B).

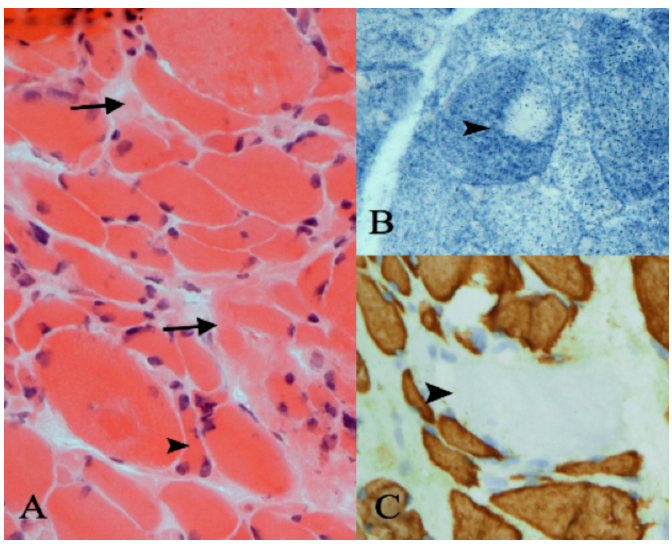

Figure 2: Flexor digitorum sublimis muscle biopsy. (A) The muscle fibres show marked variations of fiber size and endomysial fibrosis (arrow) (H&E, ×200). (B) Oxidative enzymes special stains reveal frequent targetoid fibres (arrow, NADH ×400). (C) Type II fibres are atrophic and grouped around a type I fiber (arrow, Fast Myosin Heavy Chain, ×200).

The patient received a course of intravenous methylprednisolone (MP) for 5 days, followed by a maintenance monthly dose of 1000 mg due to poor adherence to prednisolone. She was also maintained on a monthly IVIG for 3 months. The patient did not want to continue the high-dose steroid for a longer period and did not tolerate mycophenolate or azathioprine. Rituximab was added, followed by tapering of MP dose. After 2 years of follow-up, the strength of the finger flexors had normalised (MRC 5/5) on the right and improved on the left (MRC 3/5).

DISCUSSION

We presented the case of a patient with a generalised MG who developed a relapse characterised by severe and asymmetric weakness of the finger flexors, sparing of finger extensors, and intrinsic hand muscles. Moreover, there was discordance between the findings of EMG and muscle biopsy. The former was consistent with an irritative myopathy, while the latter showed some neurogenic features. MRI showed muscle oedema in the forearm volar compartment and ECR; however, the only clinically weak muscles were the finger flexors.

An association of inflammatory myositis with thymomatous, non-thymomatous, seropositive, and seronegative MG has been reported.[2] Contrary to this patient, weakness in the previous cases of inflammatory myositis predominantly involved proximal muscles, with a few cases demonstrating distal involvement;[2] however, selective and severe weakness of the finger flexors has not yet been reported. Additionally, muscle biopsy in the reported cases demonstrated evidence of inflammatory or granulomatous myositis;[2] these features were absent in our patient. Case reports of sarcoid and amyloid myopathy also reported finger flexor weakness; neither the clinical nor myopathological features of those entities were observed in this patient.[3]

Finger flexor weakness is a typical feature of sporadic inclusion body myositis (IBM).[4]

Sporadic IBM is a rare idiopathic inflammatory myopathy that typically affects individuals above the age of 50 years and characterised by a slow asymmetric progressive weakness of finger flexors and quadriceps. The coexistence of MG with sporadic IBM has recently been reported in a 67-year-old man who developed finger flexor weakness 1 year after the diagnosis of MG.[5] However, the young age of this patient and the improvement she experienced with immunotherapy argue against IBM. Finger flexor weakness is a prominent feature of myotonic dystrophy, an autosomal dominant myopathy characterised by clinical and electrophysiological myotonia.[3] Case reports or series of various rare inherited myopathies have reported finger flexor weakness.[3] The present patient lacked family history and responded well to immunotherapy, which provides a strong argument against a coexisting inherited myopathy.

The anterior interosseous nerve, a motor branch of the median nerve, supplies the FPL, FDP to the index and middle fingers, and pronator quadratus. Bilateral asymmetric anterior interosseous neuropathy has been reported in an elderly man after receiving rituximab for refractory MG, and was attributed to an immune--mediated process.[6] However, the finger flexor weakness in our patient extended beyond the innervation of the anterior

interosseous nerve, and our patient did not receive rituximab before the development of finger flexors weakness.

Histopathologic changes in MG are nonspecific.[7] Denervation changes, as observed in the present case, have been previously reported in MG patients, including fibre-type grouping, grouped atrophy, and target fibres.[8] The contemporaneous occurrence of finger flexor weakness and MG relapse, the discrepancy between EMG and biopsy findings, and the response to immunotherapy indicate that the culprit is MG. Abnormal spontaneous activities on needle EMG have been observed in presentations of severe MG and attributed to functional denervation,[9] which may explain our findings. The myopathic units and recruitment patterns on EMG could be explained by anatomical or physiological dropout of some of the muscle fibres that have been chemically and functionally denervated.[10]

In conclusion, marked weakness of the long finger flexors, albeit rare, can occur in MG and may require early aggressive therapy.

PATIENT'S CONSENT:
Informed consent was obtained from the patient.

COMPETING INTEREST:
The authors declared no competing interest.

AUTHORS' CONTRIBUTION:
MHA: Interviewed the patient, collected data, wrote the first draft of the manuscript, and reviewed the last version for publication.
HA: Read muscle histopathology slides, wrote the corresponding section of the manuscript, and reviewed the last version for publication.

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