International Journal of Scientific Reports
Krutovs V et al. Int J Sci Rep. 2023 May;9(5):157-160
http://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164

DOI: https://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20231012

Case Report

Myasthenia gravis masquerading as amyotrophic lateral sclerosis: a case report

Vladimirs Krutovs[1]*, Gundega Ķauķe[2], Marija Roddate[2], Maksims Timčenko[2], Evija Miglāne[2], Viktorija Ķēniņa[3]

[1]Faculty of Medicine, Rīgas Stradiņš University, Riga, Latvia
[2]Department of Neurology, Pauls Stradiņš Clinical University Hospital, Riga, Latvia
[3]Department of Neurology, Centre of Rare Neurological disorders, Pauls Stradiņš Clinical University Hospital, Riga, Latvia

Received: 10 March 2023
Accepted: 24 March 2023

***Correspondence:**
Dr. Vladimirs Krutovs,
E-mail: v.krutov850@gmail.com

ABSTRACT

Myasthenia gravis is an autoimmune disease that causes weakness in the skeletal muscles. It is considered to be a relatively rare disease. Most commonly the first symptoms are associated with ocular muscle weakness resulting in ptosis and/or diplopia that may be progressive during the periods of muscle exertion and resolve with rest. However, any skeletal muscle group may be affected leading to the variability of clinical symptoms and potential challenges in diagnostics. We present a case report of a 62-year-old male that initially presented with bulbar symptoms and unintentional weight loss, with atypical findings in electromyography study (the absence of decrement amplification in a combination of spontaneous muscular activity) – suggestive for amyotrophic lateral sclerosis (ALS) diagnosis. After a thorough investigation the diagnosis of ALS was not confirmed but myasthenia gravis was highly suspected and anti-MuSK antibodies came positive. The patient was prescribed Pyridostigmine, Prednisolone and underwent plasmapheresis procedure which led to significant relief of the symptoms.

Keywords: Myasthenia gravis, Anti-muscle-specific tyrosine kinase, Amyotrophic lateral sclerosis, Autoantibodies

INTRODUCTION

Myasthenia gravis (MG) is a chronic autoimmune neuromuscular disorder that affects the neuromuscular junction (NMJ), resulting in muscle weakness. The main pathophysiological mechanism is considered to be the production of autoantibodies against post-synaptic acetylcholine receptors (AChR). Nevertheless approximately 10-20% of the patients may be negative for AChR antibodies but positive for muscle-specific tyrosine kinase antibodies (MuSK antibodies).

The prevalence of MG ranges from 150 to 200 cases per million with an incidence up to 30 cases per million per year.[1] MG may affect individuals at any age however there is a tendency for a bimodal age distribution. Females may be affected more often in the second and third decades whereas males are commonly affected in the later years of life in their 60s to 70s.

MG is usually classified in two general groups based on clinical manifestation: ocular and generalized. Symptoms range from mild to severe and typically involve muscle weakness that worsens with muscular exertion and improves with rest. Generalized disease may affect all skeletal muscles which complicates the diagnosis of this disease and widens the spectrum of potential differential diagnoses. Recent studies show that MG may mimic symptoms of other conditions, such as stroke, idiopathic unilateral facial paralysis or even status asthmaticus.[2-4]

Here we would like to present a case report of a patient with MG masquerading as amyotrophic lateral sclerosis.

CASE REPORT

A 62-years-old Caucasian male presented to the neurology out-patient department complaining about difficulty swallowing with a variable severity during the day and episodes of spontaneous resolution. Symptom's worsening with dysphagia to solids as well as to liquids occurred after COVID-19 infection. Patient reported an unintentional weight loss of 13 kilograms over past 6 months after the first manifestation of dysphagia (Figure 1). He had no significant history of any other medical conditions or health issues.

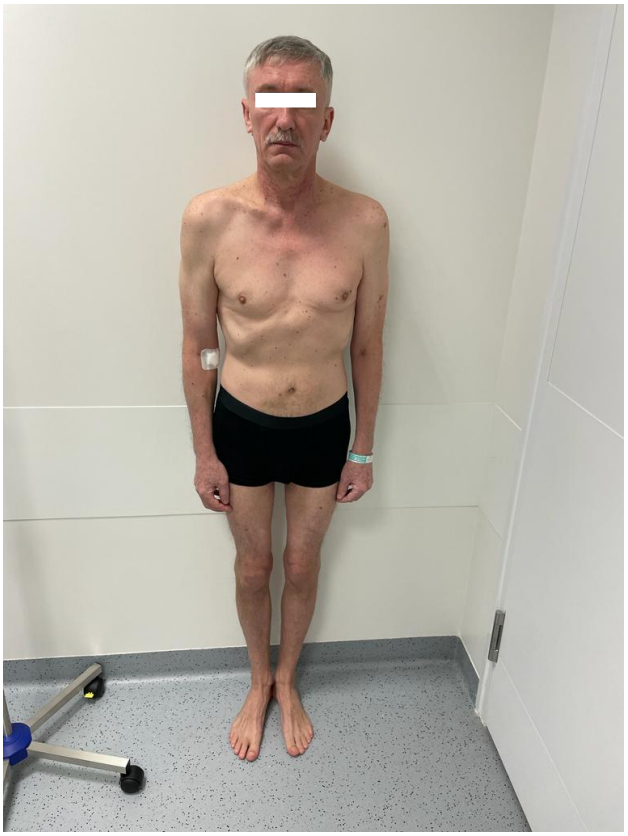

Figure 1: Muscle-specific tyrosine kinase *myasthenia gravis* (MuSK-MG) patient; Cachexia is seen.

At the moment of admission stroke was ruled out, so differential diagnosis included motoneuron disease (amyotrophic lateral sclerosis) and neuromuscular junction disease (MG) based on clinical presentation (bulbar symptoms with fluctuation during the day – more characteristic for MG, weight loss and muscular atrophy suggestive for ALS). Neurophysiological studies were performed. Nerve conduction studies did not reveal any pathological findings. Electromyography results show fibrillation in *m.orbicularis oris dextra, m.extensor digitorum communis sinistra, mm.interossei dorsalis I* (Figure 2). Repetitive nerve stimulation test showed significant decrement in *m.nasalis sinistra* at rest which then attenuated after exercise and was increasing back to pre-testing results 2 minutes after (Figure 3). According to these findings motoneuron lesion was suspected in the area of cranial nuclei and cervical region; chronic neural lesion at L3-L4 level and post-synaptic neuromuscular conduction disorder in *m.nasalis sinistra*. Although there were various indicators supporting ALS diagnosis (signs of chronic active muscular denervation characteristic for ALS) there was an absence of fasciculations – testifying motoneuron membrane instability.

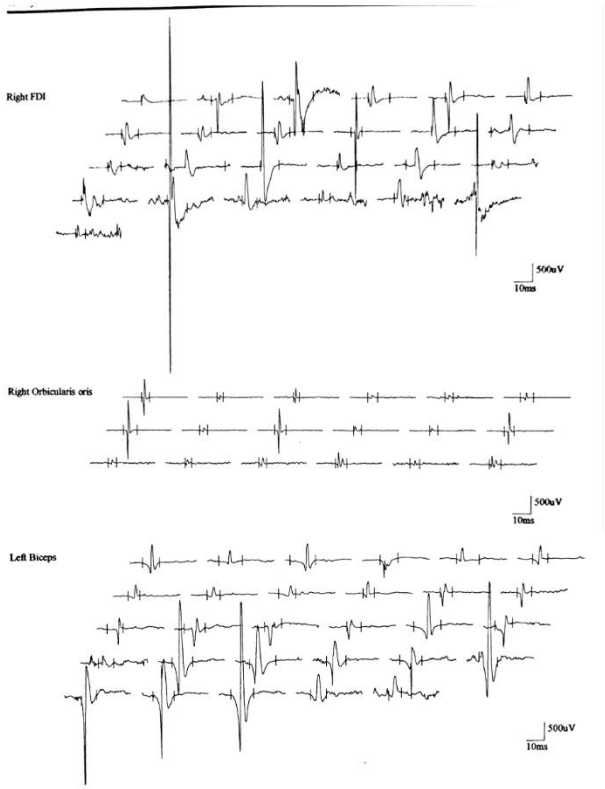

Figure 2: Electromyography of *m.interosseus dorsalis I dextra, m.orbicularis oris dextra, m.biceps brachii sinistra;* Fibrillation potentials (brief spikes) are seen.

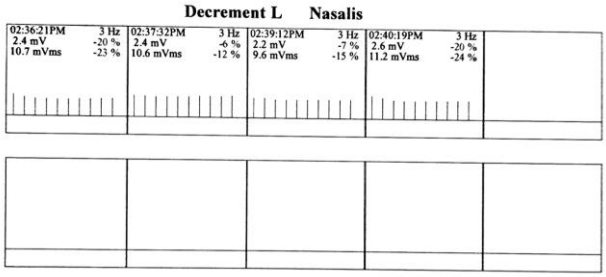

Figure 3: Repetitive nerve stimulation; decrement in *m.nasalis sinistra* is seen.

MG was diagnosed clinically with no evidence of thymoma or any signs of pathologic tissue in mediastinum on chest CT scan. The patient received a treatment plan with Pyridostigmine (60 mg 4x a day) and

Prednisolone (10 mg once in two days). Additional examination and further evaluation were indicated.

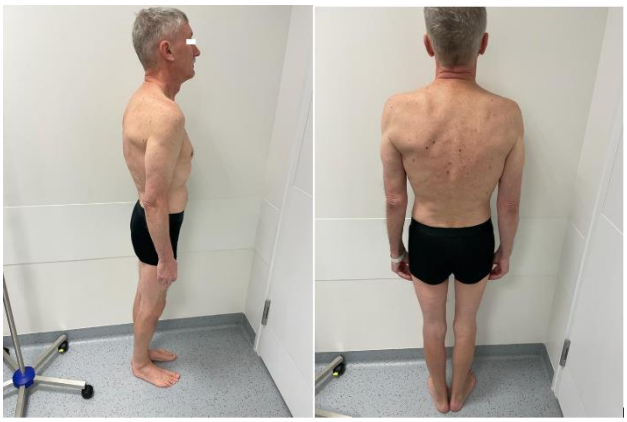

Figure 4: Muscle-specific tyrosine kinase *myasthenia gravis* (MuSK-MG) patient; Cachexia, signs of muscular wasting are seen.

One-week later patient presented to the neurology department for additional examination reporting an episode of diplopia two weeks prior current visit as well as worsening of symptoms regardless of medical therapy. On physical examination patient's higher mental function was intact, he had normal orientation, normal extra-ocular movements, no signs of diplopia. Despite the absence of fatigue or ptosis he had signs of bulbar weakness – severe dysphonia, dysphagia, and neck extensor weakness with a slight hypomimia were present. Further neurological examination did not show evidence of motor or sensory impairment. MG composite scale (MGCS) score was 16. Patient's height is 174 cm, weight 61 kg, body mass index (BMI) 20,1 kg/m^2, laboratory tests revealed hypoalbuminemia. According to Global Leadership Initiative on Malnutrition (GLIM) patient's condition is described as severe malnutrition (Figure 4).

Additional studies such as chest X-ray, abdominal, and head CT scans were performed but did not show any significant evidence of underlying pathology. Endoscopic fibrogastroduodenoscopy was performed in order to evaluate the possible causes of dysphonia and dysphagia, however revealed no abnormalities except hiatal hernia. The thoracic CT scan revealed an exacerbation of chronic bronchitis.

Patient's condition deteriorated during hospitalization. Considering the progressive nature of symptoms in combination with the results of previous examinations the diagnosis of MuSK MG was highly suspected and was confirmed later by positive anti-MuSK antibody testing. Treatment with five sessions of plasmapheresis was initiated. Plasma exchange procedure resulted in significant clinical improvement (MGCS - 4) and patient was discharged with a treatment plan including Pyridostigmine (60 mg 3-4x a day), Prednisolone (5 mg, 25 mg once in two days), Azathioprine (50 mg).

DISCUSSION

MG is a chronic autoimmune disease of the neuromuscular junction. It is considered to be the most common neuromuscular junction disorder with incidence up to 30 cases per million per year. The exact cause of MG still remains unclear, however great advancement in understanding the pathophysiology of this disorder was made, which led to a significant progress in understanding and providing treatment options for patients, improving their outcomes.

The main pathophysiological mechanism is the production of autoantibodies leading to disruption in neuromuscular transmission. Most commonly post-synaptic acetylcholine receptors are being affected by anti-AChR antibodies. However, 5-8% of MG patients may be positive for anti-MuSK antibodies that are reasonable for muscle-specific tyrosine kinase *MG* (MuSK-MG) which is considered to be more severe subtype of MG with different pathogenesis.[5] According to recent epidemiological data MuSK-MG as well as "classical" MG is affecting female population more often and has an early onset and rarely occurs after 70's.[5,6]

Clinical features may be variable but most commonly they are associated with bulbar impairment. Dysphagia, dysphonia, and dysarthria are present in up to 80% of all MuSK-MG patients. The onset of symptoms is acute and rapidly progressive, misdiagnosing and absence of adequate treatment may result in rapidly progressing respiratory crisis and potential death even though MG is a potentially treatable disorder. Another characteristic clinical finding for MuSK-MG is muscular atrophy mainly affecting facial muscles however any skeletal muscle may be affected.[7]

Diagnosis of MuSK-MG is challenging due to variability of symptoms and possibility of rapid deterioration. The initial manifestation of bulbar syndrome in a combination with unintentional weight loss and neck extensor weakness might be easily misdiagnosed with amyotrophic lateral sclerosis. Diagnostic options include testing for anti-MuSK antibodies which usually is a secondary for patients negative for anti-AChR antibodies or ones who does not respond to treatment. Other possible diagnostic approaches are neurophysiological studies such as electromyography, nerve conduction study and repetitive nerve stimulation.[5]

Treatment of MuSK-MG as well as diagnosis is quite challenging because in majority of cases the standard treatment of *MG* – acetylcholinesterase inhibitors often do not provide proper and satisfactory effect. In addition to that possible complications lead to decreased adherence. Immunosuppressive therapy is still a mainstay for patients with MuSK-MG providing various treatment schemes for better symptom controll.[8]

In this case report we present a rare manifestation of MG. Although the diagnosis of this disease usually is straightforward and is based on typical clinical manifestation (progressive, fatigable weakness of skeletal musculature worsening with increased muscle use and improvement with rest, diplopia, blurred vision) in a combination with positive antibody testing results and supportive electromyography findings (decremental response to repetitive nerve stimulation) in this case the initial diagnosis of MG was challenging.

In this case the first complains of the patient were associated with bulbar symptoms (progressive dysphagia, dysphonia) and weight loss. The physical examination in a combination with patient's history suggested the possibility of differential diagnosis of amyotrophic lateral sclerosis. Neurophysiology studies have shown decrement (which might be present in both MG and slightly less in ALS) performing repetitive nerve stimulation, but it was not typical for MG as it should have increased during the exercise, but it did not. Spontaneous electromyography activity was also present however traditionally it is not expected in neuromuscular junction disorders.[9]

Nevertheless, MG was diagnosed, and patient received treatment plan with Pyridostigmine and Prednisolone which initially had a positive impact until symptom reoccurrence. Further examination revealed more uncommon subtype of disease – MuSK-MG which required additional immunotherapy in order to provide adequate symptom control.

This case demonstrates the need for further research and description of possible subtypes of the disease with its more characteristic and unique clinical findings to gain the ability of making the diagnostic process more precise and to avoid possible delays in the management of patients providing better outcomes.

CONCLUSION

MG is a rare disease that may have variable clinical manifestations providing challenges for the diagnosis of this disorder. Although it is potentially treatable the prolongation of diagnosis and delayed treatment may cause a life-threatening condition - myasthenic crisis.

Our case highlights the importance of having a high suspicion for neuromuscular disorders in patients with atypical clinical presentation potentially mimicking other medical conditions to provide adequate treatment and reduce the risks of complications and morbidity.

ACKNOWLEDGEMENTS

We would like to express our sincere gratitude and appreciation to the patient and all healthcare providers that took part in patient's care.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Dresser L, Wlodarski R, Rezania K, Soliven B. Myasthenia Gravis: Epidemiology, Pathophysiology and Clinical Manifestations. J Clin Med. 2021;10(11):2235.
2. Sarath Menon Ramachandra Menon et al. Myasthenia gravis masquerading as acute stroke: a case report. Pan African Medical Journal. 2020;37:305.
3. Elnazeir M, Narayanan S, Badugu P, Hussain A, Tareen T, Hernandez AR, et al. Myasthenia Gravis Masquerading as an Idiopathic Unilateral Facial Paralysis (Bell's Palsy)—A Very Rare and Unique Clinical Find. Front Neurol. 2020;11:709.
4. Pirwani N, Wrublik S, Ambati S. Myasthenia Gravis Masquerading as Status Asthmaticus. Case Reports Pediatr. 2021;2021:6959701.
5. Rodolico C, Bonanno C, Toscano A, Vita G. MuSK-Associated Myasthenia Gravis: Clinical Features and Management. Front Neurol. 2020;11:660.
6. Evoli A, Alboini PE, Damato V, Iorio R, Provenzano C, Bartoccioni E, et al. Myasthenia gravis with antibodies to MuSK: an update. Ann. N.Y. Acad Sci. 2018;1412:82-9.
7. Zouvelou V, Rentzos M, Toulas P, Evdokimidis I. MRI Evidence of Early Muscle Atrophy in MuSK Positive Myasthenia Gravis. J Neuroimaging. 2011;21(3):303-5.
8. Silvestri NJ, Wolfe GI. Myasthenia Gravis. Semin Neurol. 2012;32(03):215-26.
9. Tsironis T, Catania S. Reversible spontaneous EMG activity during myasthenic crisis: Two case reports, eNeurologicalSci. 2019;14:16-8.

Cite this article as: Krutovs V, Ķauķe G, Roddate M, Timčenko M, Miglāne E, Ķēniņa V. Myasthenia gravis masquerading as amyotrophic lateral sclerosis: a case report. Int J Sci Rep 2023;9(5):157-60.