Case Reports

Journal of INTERNATIONAL MEDICAL RESEARCH

Journal of International Medical Research
50(8) 1–7

DOI: 10.1177/03000605221109395
journals.sagepub.com/home/imr
SAGE

Isolated dysarthria as the sole manifestation of myasthenia gravis: a case report

Wei Li[1,*], Ling He[2,*], Xiaodong Jin[1], Li Li[1], Congcong Sun[3] and Cuilan Wang[3]

Abstract

Myasthenia gravis (MG) is an acquired autoimmune disease. Its clinical manifestations comprise ptosis, diplopia, dysarthria, dysphagia, limb weakness, and in severe cases, respiratory muscle involvement. Dysarthria as an exclusive initial and primary complaint in MG is rare and seldom reported. In this paper, we report a case of type IIIb MG with isolated dysarthria as the only clinical manifestation and we review the relevant literature. The patient was a 62-year-old man who presented with episodes of slurred speech for 20 days that had worsened in the previous 9 days. His medical history comprised hypertension, diabetes mellitus, and coronary heart disease. The initial diagnosis on admission was transient ischemic attack. Careful re-examination of the patient's history revealed that his symptoms mainly involved increasingly worse slurred speech episodes without drinking or swallowing difficulties, and no significant improvement with rest was observed. Electromyography and autoantibody profiling led to a diagnosis of type IIIb MG. His symptoms improved after the oral administration of pyridostigmine bromide 60 mg. Laryngeal MG is important to differentiate from stroke. It is necessary to perform a computerized voice analysis when encountering patients with atypical symptoms of MG.

Keywords

Myasthenia gravis, isolated dysarthria, laryngeal, late-onset MG, acoustic analysis, case report, atypical symptoms

Date received: 3 February 2022; accepted: 8 June 2022

[1]Department of Geriatrics, ZiBo Central Hospital, Zibo, China
[2]Department of Neurology, Jilin Central General Hospital, Jilin, China
[3]Department of Neurology, Qilu Hospital, Cheeloo College of Medicine, Shandong University, Jinan, China

*These authors contributed equally to this work.

Corresponding author:
Wei Li, Department of Geriatrics, ZiBo Central Hospital, 54 Gongqingtuan West Road, Zibo 255036, Shandong, China.
Email: kaixin0435@163.com

Introduction

Myasthenia gravis (MG) is a disorder of neuromuscular transmission, resulting from binding of autoantibodies to components of the neuromuscular junction, most commonly the acetylcholine receptor (AChR).[1] The main manifestation is easy fatigue of the affected skeletal muscles, which often worsens after activity and improves after rest ("morning lightness and evening heaviness").[2] According to the Myasthenia Gravis Foundation of America (MGFA), MG can be classified into types I to V, of which type IIIb mainly involves the pharyngeal muscles and is less commonly encountered in clinical practice.[3] In this paper, we report a case of type IIIb MG with isolated dysarthria as the only clinical manifestation and we review the relevant literature. Our main purpose was to alert clinicians to the possibility of dysarthria as the sole presenting symptom of MG to improve early diagnosis rates and avoid misdiagnosis. We recommend the objective assessment of voice quality when encountering patients with atypical symptoms of MG.

Case report

The patient was a 62-year-old man who was admitted to the hospital on 25 June 2021, with a complaint of episodes of slurred speech for 20 days that had worsened in the previous 9 days. The main manifestations are slurred speech and slower speech speed. The initial episodes persisted for approximately 10 minutes, with no transient blackout or disturbance of consciousness, headache or dizziness, diplopia, or difficulty in swallowing, drinking, or limb movement. The episodes had gradually worsened over a period of 9 days, with 2 to 3 episodes per day, each persisting for approximately 30 minutes. The patient had a history of hypertension (>20 years), diabetes mellitus (8 years), and coronary heart disease (8 years). At the age of 16 years, the patient developed bilateral vision loss after retinal detachment following trauma to both eyes. The patient denied habits such as smoking and alcohol consumption.

On admission (at the onset of disease), his temperature was 36.5°C, heart rate was 70 beats per minute, respiratory rate was 17 beats per minute, and blood pressure was 144/86 mmHg. Physical examination revealed that both irises were light grayish-white in color, with no light perception, irregular bilateral pupils, and loss of direct and indirect light reflexes. The following were also identified: dysarthria; tongue extension in the center; limb muscle strength grade 5; normal muscle tone; negative Babinski sign; and bilateral Chaddock reflex. Laboratory tests, comprising routine blood testing, coagulation series, testing for rheumatic autoimmune diseases, thyroid function, tumor markers, liver and kidney function, and electrolytes, revealed no significant abnormalities. Ancillary examinations (cranial plain magnetic resonance imaging and susceptibility-weighted imaging) revealed no significant abnormalities, while cranial magnetic resonance angiography (MRA) indicated mild cerebral arteriosclerosis. Carotid vascular MRA demonstrated carotid arteriosclerosis with limited stenosis of the intracranial segment of the left vertebral artery; however, transcranial Doppler imaging showed no significant abnormalities in the blood flow spectrum of each vessel.

The initial diagnosis on admission was transient ischemic attack (vertebrobasilar system). Careful re-examination of the patient's history revealed that his symptoms comprised mainly gradually worsening slurred speech episodes without drinking or swallowing difficulties, and no significant improvement was observed with rest. Thus, MG was not ruled out, and a fatigue

test was performed; however, the results were negative. The neostigmine test results were also negative. Electromyography: facial and paramedian nerve repetitive nerve stimulation (RNS) tests was positive and negative for the remaining nerves. Chest computed tomography revealed a small number of inflammatory, fibrous foci in both lungs but no thymoma. Autoantibody profile testing for neuromuscular junction disease revealed an AchR-Ab immunoglobulin-G (IgG) level of >20 nmol/L (<0.45 nmol/L is considered negative). Therefore, the clinical diagnosis was MG (type IIIb), and the patient's symptoms improved after the oral administration of pyridostigmine bromide 60 mg three times daily (TID). A follow-up telephone call 2 months after discharge revealed that the patient had adhered to the 60 mg TID regimen of pyridostigmine bromide without recurring symptoms of slurred speech.

Discussion

MG can develop at any age, with peaks at approximately 30 and 50 years of age.[1] The 2020 edition of the Chinese guidelines for MG adopts the clinical staging of the MGFA[1] and refers to the first onset of MG after 50 years of age as late-onset MG (LOMG), with a slightly higher incidence in men than in women. The multiple interferences of frailty and primary muscle weakness make the easy fatigue and "morning lightness" of LOMG difficult to recognize, particularly in patients aged >70 years.[4]

More than 80% of MG patients have ocular MG, with the initial symptoms comprising mainly extraocular muscle weakness and diplopia.[1] As the disease progresses, patients often present with symptoms of pharyngeal muscle involvement, such as difficulties drinking and eating, dysphagia, and hoarseness. However, it has been reported that in 6% to 27% of MG cases, dysarthria can be the first and only symptom,[5] and it takes several years before the patient develops other symptoms, making the diagnosis difficult. Laryngeal MG is a rare and easily misdiagnosed condition, particularly when the patient is first seen in another department, that can present as dysarthria and dysphagia. Hernandez Fustes et al.[6] reported a case of LOMG in an 85-year-old woman with positive serum AchR-Ab who presented with dysarthria and dysphagia. A Brazilian study found that dysarthria occurs as frequently as diplopia in patients with LOMG[7] and can occur at any stage of the disease. Furthermore, in a series of 20 cases of MG of the larynx, Yang et al.[8] found that dysarthria was the most common symptom, accounting for 46.7% of cases, and 63% of the patients first presented to the Ear, Nose, and Throat Department, while only 7 (23.3%) were diagnosed with MG at the first visit. Other patients were diagnosed with chronic pharyngitis, neuropsychiatric disorders, ischemic encephalopathy, or amyotrophic lateral sclerosis. These studies highlight the need for inclusion of MG as an early differential diagnosis in patients presenting with symptoms of LOMG, particularly in those of advanced age and with risk factors for stroke, presenting with pharyngeal symptoms.

In this case (an elderly man with high risk factors for stroke, such as hypertension and diabetes mellitus), when the sudden onset of stroke occurred, the attending physician first considered ischemic cerebrovascular disease as the diagnosis and performed neuroimaging. It is undeniable that dysarthria owing to stroke is common; however, this condition is typically accompanied by other neurological symptoms, such as hemiparesis, sensory deficits, clumsiness of the arms and legs, and central facial palsy. Although isolated dysarthria has been reported in stroke

syndromes, it is very rare.[9] One study reported that the incidence of isolated dysarthria in stroke was <1.3%.[10] The differential diagnosis of this clinical presentation is also extensive, and previously published cases of isolated/paroxysmal dysarthria of different etiologies are listed in Table 1.[11–27]

During the follow-up consultation in this case, neuroimaging was performed; however, the findings could not explain the patient's condition. A detailed history was taken again, which revealed worsening episodes of slurred speech, which was easily induced after talking for a longer period of time. Therefore, MG was considered a possible diagnosis because extraocular muscle paralysis and diplopia were not observed after ocular trauma, and there were no apparent positive neurological signs. Testing for both AchR-Ab and RNS was performed, which supported the diagnosis of MG. The findings in this case suggest that the sudden onset of isolated dysarthria is rare in stroke, and the lack of accompanying signs or symptoms should be considered a possible indication of MG. AchR-Ab and RNS testing should thus be performed promptly in cases of

Table 1. Previous reports of isolated/paroxysmal dysarthria of different etiologies.

First author, publication year	Language	Age (years)/ sex	Neurological symptom	Etiology(ies)
Kayali et al., 2021[11]	English	55/M, 69/M, 64/M 63/M, 60/M, 62/M	Isolated dysarthria	Hypoglossal nerve paralysis (supratentorial ischemic lesions)
Simpson et al., 2021[12]	English	43/M	Isolated dysarthria	Internal carotid artery dissection
Papastergios et al., 2021[13]	English	48/F	Paroxysmal dysarthria and ataxia	Multiple sclerosis
Bhagat et al., 2020[14]	English	79/M	Isolated dysarthria	COVID-19
Xia et al., 2019[15]	English	74/M	Paroxysmal dysarthria	Solitary sclerosis
Kollmann et al., 2019[16]	English	59/F	Paroxysmal dysarthria	MOG antibody-related isolated Rhombencephalitis
Garcia-Estevez et al., 2018[17]	Spanish	75/M, 77/M	Isolated dysarthria and dysphagia	Bilateral acute lacunar ischemic stroke
Geraldes et al., 2017[18]	English	64/F	Paroxysmal dysarthria	Radiotherapy
Tremolizzo et al., 2015[19]	English	70/F, 69/M, 81/M, 62/M	Isolated dysarthria	Myasthenia gravis
Jain et al., 2014[20]	English	30/F	Paroxysmal dysarthria	Clinically isolated syndrome
Codelupp et al., 2013[21]	English	33/F, 46/M	Isolated dysarthria	Midbrain demyelinating lesion
Dressel et al., 2012[22]	English	46/M	Isolated transient dysarthria	Irinotecan-induced adverse event
Tsugawa et al., 2007[23]	Japanese	77/M	Isolated dysarthria	Small cortical infarction
Gustaw et al., 2001[24]	English	65/M	Isolated dysarthria	*Borrelia burgdorferi* infection
Frank et al., 2000[25]	English	69/F	Isolated dysarthria and dysphagia	Creutzfeldt–Jakob disease
Urban et al., 1999[9]	English	55/M, 71/F, 50/M, 50/F 48/M, 76/F, 62/M	Isolated dysarthria	Extracerebellar lacunar stroke
Manto et al., 1996[26]	English	44/F	Isolated dysarthria	Heat stroke
Gironell et al., 1996[27]	English	78/M	Isolated dysarthria	Right paravermal infarction

M, male; F, female; MOG, myelin oligodendrocyte glycoprotein.

isolated dysarthria to assess the pathological changes in the neuromuscular junction to avoid diagnostic delay.

The vocal alterations of MG may be due to weakness of the tongue and palate muscles and are characterized by heavy nasal sounds, difficulty maintaining pitch, voice fatigue, intermittent voice loss, hoarseness and coarseness, vocal hilar insufficiency, imprecise articulation, and altered speech fluency.[28] Because the assessment of dysarthria using the quantitative MG score is graded using a scale of 1 to 50, it is difficult to accurately identify patients with mild dysarthria, and the evaluation procedure lacks objectivity. The measured parameters of computerized voice analysis, which is now widely used for acoustic monitoring, can be used for the objective assessment of voice quality. Sheng et al.[29] evaluated MG patients with dysarthria using this technique, highlighting the value of computerized acoustic examination for both diagnostic and therapeutic evaluation in patients with MG. Ayres et al.[30] also used computerized acoustic tests for voice data collection, perceptual-auditory voice analysis, and voice acoustic analysis in MG patients and healthy controls. The authors found that the MG questionnaire was not sufficiently sensitive to differentiate patients with greater and lesser speech impairment. Therefore, it is important that a proactive approach be taken for these patients by referring them for speech therapy clinical evaluation, rather than using only a questionnaire based on self-perception. However, voice analysis was not performed in our patient because the diagnosis of MG was supported by the timely completion of electromyography and serum antibody testing. These tests provide both a quantitative assessment of disease severity as well as an objective indicator of efficacy evaluation after medication administration. Clinically, it is necessary to perform an acoustic examination when encountering patients with atypical MG symptoms, such as in our case.

In conclusion, the clinical presentation of MG is highly heterogeneous, and atypical symptoms as the main manifestation or the first symptom, particularly when isolated dysarthria is the first symptom, should be considered to indicate the possibility of MG. Detailed history taking is crucial, and early and comprehensive examinations, such as the neostigmine test, computerized acoustic test, electromyography, and serum antibody testing, should be completed to assist in the exclusion or diagnosis of MG and to avoid misdiagnosis.

Ethics statement

Ethics approval is not required in our institution for case reports. Written informed consent for treatment and publication of this case report were obtained from the patient.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ORCID iD

Wei Li https://orcid.org/0000-0001-6873-907X

References

1. Gilhus NE. Myasthenia gravis. *N Engl J Med* 2016; 375: 2570–2581.
2. Chang T. Chinese guidelines for the diagnosis and treatment of myasthenia gravis (2020 edition). *Chin J Neuroimmunol Neurol* 2021; 28: 1–12.
3. Jaretzki A 3rd, Barohn RJ, Ernstoff RM, et al. Myasthenia gravis: recommendations for clinical research standards. Task Force of the Medical Scientific Advisory Board of the Myasthenia Gravis Foundation of

America. *Ann Thorac Surg* 2000; 70: 327–334.
4. Vincent A, Clover L, Buckley C, et al. UK Myasthenia Gravis Survey. Evidence of underdiagnosis of myasthenia gravis in older people. *J Neurol Neurosurg Psychiatry* 2003; 74: 1105–1108.
5. Neal GD, Clarke LR. Neuromuscular disorders. *Otol Clin North Am* 1987; 20: 195–201.
6. Hernandez Fustes OJ, Arteaga Rodriguez C and Hernandez Fustes OJ. Myasthenia gravis with elderly onset at advanced age. *Cureus* 2020; 12: e6808
7. Aguiar AAX, Carvalho AF, Costa CMC, et al. Myasthenia gravis in Ceara, Brazil: clinical and epidemiological aspects. *Arq Neuropsiquiatr* 2010; 68: 843–848.
8. Yang X, Niu L, Yang C, et al. Clinical features of laryngeal myasthenia gravis: a case series. *Am J Otolaryngol* 2018; 40: 292–296.
9. Urban PP, Wicht S, Hopf HC, et al. Isolated dysarthria due to extracerebellar lacunar stroke: a central monoparesis of the tongue. *J Neurol Neurosurg Psychiatry* 1999; 66: 495–501.
10. Beliavsky A, Perry JJ, Dowlatshahi D, et al. Acute isolated dysarthria is associated with a high risk of stroke. *Cerebrovasc Dis Extra* 2014; 4: 182–185.
11. Kayali N and Temel M. Isolated dysarthria due to hypoglossal palsy caused by supratentorial ischemic stroke: radiological and electropsyological analysis. *Clin Neurol Neurosurg* 2021; 202: 106545.
12. Simpson D, David O and Nasr F. An unusual presentation of dysarthria in a young patient, a stroke mimic. *Acute Med* 2021; 20: 140–143.
13. Iorio R, Capone F, Plantone D et al. Paroxysmal ataxia and dysarthria in multiple sclerosis. *J Clin Neurosci* 2014, 21: 174–175.
14. Bhagat R, Narayanan S, Karki BJ, et al. A case of isolated dysarthria in a COVID-19 infected stroke patient: a nondisabling neurological symptom with grave prognosis. *Cureus* 2020; 12: e9921–e9921.
15. Xia Y, Shoemaker T, Gorelick N, et al. Solitary sclerosis presenting as isolated spontaneous paroxysmal dysarthria. *eNeurologicalSci* 2019; 14: 98–100.
16. Kollmann P and Van Pesch V. MOG antibody-related isolated rhombencephalitis revealed by paroxysmal dysarthria. *J Neurol Sci* 2019; 405: 116417.
17. Garcia-Estevez DA, Lopez-Diaz LM, Pardo-Parrado M, et al. [Isolated dysarthria and dysphagia as the presenting symptoms of simultaneous bilateral acute lagunar ischaemic stroke]. *Revista de neurologia* 2018; 66: 33.
18. Geraldes T, Alemany M, Lozano A, et al. Hypoglossal myokymia presenting as paroxysmal dysarthria following head and neck radiotherapy. *J Neurol Neurosurg Psychiatry* 2017; 88: 709.
19. Tremolizzo L, Giopato F, Piatti ML, et al. Myasthenia gravis mimicking stroke: a case series with sudden onset dysarthria. *Neurol Sci* 2015; 36: 895–898.
20. Jain RS, Handa R, Vyas A, et al. Clinically isolated syndrome presenting as paroxysmal dysarthria: a rare but typical presentation. *Neurol Sci* 2014; 35: 1313–1314.
21. Codeluppi L, Bigliardi G, Chiari A, et al. Isolated paroxysmal dysarthria caused by a single demyelinating midbrain lesion. *BMJ Case Rep* 2013; 2013: bcr2013200777. undefined.
22. Dressel AJ, Van der Mijn JC, Aalders IJ, et al. Irinotecan-induced dysarthria. *Case Rep Oncol* 2012; 5: 47–51.
23. Tsugawa J, Tsuboi Y, Inoue H, et al. [A small cortical infarction showing dysarthria and left hypoglossal paresis]. *Brain Nerve* 2007; 59: 1373–1376.
24. Gustaw K and Mirecka U. Dysarthria as the isolated clinical symptom of borreliosis–a case report. *Ann Agric Environ Med* 2001; 8: 95–97.
25. Frank HG, Schnorf H, Genoud D, et al. Creutzfeldt-Jakob disease presenting as isolated dysarthria and dysphagia due to pseudobulbar palsy. *Eur Neurol* 2000; 44: 126–127.
26. Manto MU. Isolated cerebellar dysarthria associated with a heat stroke. *Clin Neurol Neurosurg* 1996; 98: 55–56.

27. Gironell A, Arboix A and Martí-Vilalta JL. Isolated dysarthria caused by a right paravermal infarction. *J Neurol Neurosurg Psychiatry* 1996; 61: 205–206.
28. Konstantopoulos K, Christou YP, Vogazianos P, et al. A quantitative method for the assessment of dysarthrophonia in myasthenia gravis. *J Neurol Sci* 2017; 377: 42–46.
29. Sheng Z, Dong Y, Yu M, et al. Efficacy and acoustic evaluation of Qiangli Yiqi formula in the treatment of myasthenia gravis. *World Journal of Traditional Chinese and Western Medicine* 2015; 10: 788–790 + 794.
30. Ayres A, Winckler PB, Jacinto-Scudeiro LA, et al. Speech characteristics in individuals with myasthenia gravis: a case control study. *Logoped Phoniatr Vocol* 2020; 47: 35–42.