

Clinical and selected ancillary findings of patients with myasthenia gravis at Bach Mai hospital in 2025-2026

Dang Mai Phuong¹✉, Nguyen Van Tuan^{2,3,4}, Nguyen Thanh Binh³

¹ Nghe An Friendship General Hospital

² Tam Anh General Hospital

³ Hanoi Medical University

⁴ University of Medicine and Pharmacy, Vietnam National University, Hanoi

Correspondence to

Dang Mai Phuong, MD, MSc
Nghe An Friendship General Hospital
Email: phuongdang9196@gmail.com

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ABSTRACT

Background: Myasthenia gravis is an autoimmune disease of the neuromuscular junction characterized by fluctuating weakness and fatigability of skeletal muscles of varying severity.

Objective: To describe the clinical characteristics and selected ancillary findings of patients with myasthenia gravis treated at the Neurology Institute, Bach Mai Hospital, in 2025-2026.

Subjects and Methods: A descriptive cross-sectional study was conducted in 60 patients with a confirmed diagnosis of myasthenia gravis.

Results: The mean age was 47.75 ± 16.99 years, and females accounted for 65.0% of the patients. Ocular symptoms were the most common initial manifestations (66.7%). At the time of evaluation, ptosis was present in 86.7% of patients; 60.0% of patients had disease onset before the age of 50 years. Bulbar symptoms included dysarthria (60.0%), dysphagia and weak cough (56.7% each), and choking when drinking (55.0%). Neck weakness, limb weakness, and dyspnea were observed in 48.3%, 45.0%, and 40.0% of patients, respectively. Generalized myasthenia gravis accounted for 68.3% of cases, and 11.7% of patients were experiencing a myasthenic crisis at the time of the study. According to the MGFA classification, MGFA classes I-III accounted for 88.3% of patients, whereas classes IV-V accounted for 11.7%. The mean MG-ADL score was 9.02 ± 5.72 , and the MGFA IV-V group had a significantly higher score than the MGFA I-III group (19.29 ± 5.74 vs. 7.66 ± 4.15 ; $p < 0.001$). AChR-Ab was positive in 88.3% of patients, and unoperated thymoma was present in 30.0%.

Conclusion: Myasthenia gravis most commonly presented with ocular symptoms, particularly ptosis. At the time of the study, most patients had generalized myasthenia gravis. Limitations in activities of daily living were greater in patients with more severe disease.

Most patients were positive for AChR-Ab, and thymoma was relatively common.

Keywords: Myasthenia gravis; Acetylcholine receptor antibody; Thymoma.

I. INTRODUCTION

Myasthenia gravis (MG) is an autoimmune disorder of the neuromuscular junction, typically caused by autoantibodies directed against receptors on the postsynaptic membrane. Acetylcholine receptor antibodies (AChR-Ab) are detected in approximately 80-85% of patients, while antibodies against muscle-specific tyrosine kinase (MuSK-Ab) and other autoantibodies, such as those against LRP4, may also be present.¹ The disease is characterized by fluctuating muscle weakness and fatigability that worsen with exertion and improve with rest.¹

The clinical manifestations of myasthenia gravis are diverse, ranging from mild symptoms confined to the extraocular muscles, such as ptosis and diplopia, to severe generalized weakness involving the bulbar muscles, resulting in dysphagia, dysarthria, and choking, as well as acute respiratory failure during a myasthenic crisis. Myasthenic crisis is a serious condition that requires prompt recognition and management.¹⁻³ The thymus plays an important role in the pathogenesis of myasthenia gravis, with thymic hyperplasia and thymoma being among the most common thymic abnormalities.⁴

In Vietnam, Bach Mai Hospital is a tertiary referral center that receives and treats patients with myasthenia gravis from the northern provinces. Assessment of clinical and ancillary findings may contribute additional data on the clinical presentation of myasthenia gravis in routine practice. Therefore, this study was conducted to describe the clinical

characteristics and selected ancillary findings of patients with myasthenia gravis at Bach Mai Hospital in 2025-2026.

II. SUBJECTS AND METHODS

2.1. Study population

The study included 60 patients with a confirmed diagnosis of myasthenia gravis who were admitted to and treated at the Neurology Institute, Bach Mai Hospital in 2025-2026.

Inclusion criteria

Patients with a confirmed diagnosis of myasthenia gravis based on a combination of clinical manifestations, specific antibody testing, and supportive tests according to the Japanese diagnostic criteria:⁵

A. Clinical symptoms

1. Ptosis
2. Ophthalmoplegia
3. Facial muscle weakness
4. Dysarthria
5. Dysphagia
6. Masticatory muscle weakness
7. Neck weakness
8. Limb weakness
9. Respiratory dysfunction

Note: These symptoms are characterized by fatigability and fluctuation throughout the day.

B. Disease-associated autoantibodies

1. Positive acetylcholine receptor (AChR) antibody
2. Positive muscle-specific tyrosine kinase (MuSK) antibody

C. Evidence of neuromuscular junction dysfunction

1. Positive eyelid fatigability test
2. Positive ice-pack test
3. Positive edrophonium chloride (Tensilon) test
4. Positive repetitive nerve stimulation test

5. Increased jitter on single-fiber electromyography

D. Supportive diagnostic evidence

A history of improvement following plasma exchange.

E. Diagnostic determination

Definite: A diagnosis of myasthenia gravis was considered definite if either of the following conditions was met:

One or more symptoms listed in section A plus any criterion in section B.

One or more symptoms listed in section A plus any criterion in section C, with other diseases excluded.

Probable: One or more symptoms listed in section A plus the criterion in section D, with other diseases excluded.

Exclusion criteria

Patients with congenital myasthenic syndromes, Lambert-Eaton myasthenic syndrome, drug-induced myopathy, amyotrophic lateral sclerosis, or medical records lacking essential required information were excluded.

2.2. Study methods

Study design

Descriptive cross-sectional study.

Sample size and sampling method

Convenience sampling was used to include all eligible patients admitted during the study period.

Main study variables

- General characteristics: age, sex, age at disease onset, and disease duration.
- Clinical characteristics at disease onset: initial site of onset (ocular, bulbar, limb weakness, respiratory, or generalized).
- Current clinical manifestations: ocular signs (ptosis, diplopia, and limitation of ocular motility); bulbar symptoms (dysarthria, dysphagia, choking when drinking, and weak cough); and

generalized/respiratory symptoms (dyspnea, neck weakness, limb weakness, and generalized weakness).

- Assessment of disease severity: Myasthenia Gravis Foundation of America (MGFA) classification (classes I-III and IV-V) and the Myasthenia Gravis Activities of Daily Living (MG-ADL) scale.

- Disease course: history of myasthenic crisis and the presence of myasthenic crisis at the time of the study.

- Ancillary findings: serum acetylcholine receptor antibody (AChR-Ab) and muscle-specific tyrosine kinase antibody (MuSK-Ab) testing, and evaluation of the thymus by chest computed tomography.

Statistical analysis: Data were entered and analyzed using SPSS version 20.0. Quantitative variables were presented as mean $\pm$ standard deviation (SD), or as median (Q1-Q3) and minimum-maximum (Min-Max), depending on the distribution of the variable. Qualitative variables were presented as frequencies (n) and percentages (%). The Mann-Whitney U test was used to compare MG-ADL scores between the MGFA I-III and MGFA IV-V groups. A p -value < 0.05 was considered statistically significant.

Ethical considerations: The study was approved by the Institutional Review Board for Biomedical Research of Bach Mai Hospital. Participation was entirely voluntary. All personal information was coded and kept confidential throughout data collection, processing, and analysis. The data were used solely for scientific research purposes.

III. RESULTS

3.1. General characteristics of patients with myasthenia gravis

Table 1. General characteristics of patients with myasthenia gravis

Characteristic	n (%) / Value
Female	39 (65.0)
Male	21 (35.0)
Mean age, years	47.75 ± 16.99
Mean age at onset, years	45.70 ± 17.33
Onset before 50 years of age	36 (60.0)
Disease duration <1 year	40 (66.7)
Median disease duration (Q1-Q3), years	0 (0-1)
Disease duration (Min-Max), years	0-17

Females accounted for 65.0% of the study population, with a female-to-male ratio of approximately 1.86:1. The mean age was 47.75 ± 16.99 years; 60.0% of patients had disease onset before the age of 50 years, and 66.7% had a disease duration of less than 1 year.

3.2. Clinical characteristics

Table 2. Characteristics of disease onset

Site of onset	n	%
Ocular	40	66.7
Bulbar	3	5.0
Limb weakness	6	10.0
Respiratory	3	5.0
Generalized	8	13.3
Total	60	100.0

Ocular symptoms were the most common initial manifestations, accounting for 66.7% of cases, followed by generalized onset (13.3%) and limb weakness (10.0%).

Table 3. Distribution of clinical symptoms

Symptom group	Symptom	n	%
Ocular	Ptosis	52	86.7
	Diplopia	21	35.0
	Limitation of ocular motility	13	21.7

Symptom group	Symptom	n	%
Bulbar	Dysarthria	36	60.0
	Dysphagia	34	56.7
	Weak cough	34	56.7
	Choking when drinking	33	55.0
Generalized/ respiratory	Neck weakness	29	48.3
	Limb weakness	27	45.0
	Generalized weakness	27	45.0
	Dyspnea	24	40.0

Ptosis was the most common clinical manifestation (86.7%). All bulbar symptoms were observed in more than half of the patients. Neck weakness, limb weakness, and dyspnea were present in 48.3%, 45.0%, and 40.0% of patients, respectively.

Table 4. Disease type and clinical severity according to the MGFA classification

Characteristic	n	%
Disease type		
Ocular myasthenia gravis	19	31.7
Generalized myasthenia gravis	41	68.3
MGFA classification		
I	19	31.7
IIa	3	5.0
IIb	7	11.7
IIIa	8	13.3
IIIb	16	26.7
IVa	0	0.0
IVb	1	1.7
V	6	10.0
MGFA I-III	53	88.3
MGFA IV-V	7	11.7

Generalized myasthenia gravis accounted for 68.3% of cases. MGFA classes I and IIIb were the two most common classes, accounting for 31.7% and 26.7% of patients, respectively, whereas MGFA classes IV-V accounted for 11.7%.

Table 5. Characteristics of myasthenic crisis and MG-ADL scores

Characteristic	n (%) / Value
No history of myasthenic crisis	40 (66.7)
History of ≥ 1 myasthenic crisis	20 (33.3)
Myasthenic crisis at the time of the study	7 (11.7)
No myasthenic crisis at the time of the study	53 (88.3)
Mean MG-ADL $\pm$ SD	9.02 $\pm$ 5.72
Median MG-ADL	8.5
MG-ADL (Min-Max)	0-24

One-third of patients had a history of at least one myasthenic crisis, and 11.7% were experiencing a myasthenic crisis at the time of the study. The mean MG-ADL score was 9.02 ± 5.72 .

Table 6. MG-ADL scores according to MGFA disease severity

Disease severity	Mean MG-ADL $\pm$ SD	p-value
MGFA I-III	7.66 $\pm$ 4.15	<0.001
MGFA IV-V	19.29 $\pm$ 5.74	

The MG-ADL score was significantly higher in the MGFA IV-V group than in the MGFA I-III group (19.29 ± 5.74 vs. 7.66 ± 4.15 ; $p < 0.001$).

3.3. Selected ancillary findings

Table 7. Selected ancillary findings in patients with myasthenia gravis

Characteristic	n	%
Thymic findings		
Normal thymus	28	46.7
Thymic hyperplasia	2	3.3
Thymoma without prior surgery	18	30.0
Previous thymoma surgery	12	20.0
Antibodies		
AChR-Ab positive	53	88.3

Characteristic	n	%
AChR-Ab negative	7	11.7
MuSK-Ab positive	2	3.3
MuSK-Ab negative	58	96.7

Thymoma without prior surgery was identified in 30.0% of patients, thymic hyperplasia in 3.3%, and 20.0% had previously undergone surgery for thymoma. AChR-Ab was positive in 88.3% of patients, whereas MuSK-Ab was positive in 3.3%.

IV DISCUSSION

In this study of 60 patients with myasthenia gravis treated at Bach Mai Hospital in 2025-2026, females accounted for 65.0% of the study population, with a female-to-male ratio of approximately 1.86:1. The mean age was 47.75 ± 16.99 years, the mean age at disease onset was 45.70 ± 17.33 years, and 60.0% of patients had disease onset before the age of 50 years. These findings are generally consistent with the epidemiological characteristics of MG reported in the literature, which demonstrate age- and sex-related differences, with a female predominance particularly among patients with early-onset disease.¹ The age and sex characteristics of our study population were also relatively consistent with previous descriptions of MG in the Vietnamese literature.⁶

Most patients in the present study had a relatively short disease duration. Specifically, 66.7% had a disease duration of less than one year, while the median disease duration was 0 years (Q1-Q3: 0-1). This characteristic should be considered when interpreting the clinical findings because the manifestations of MG may change during the disease course. In particular, patients who initially present with symptoms limited to the ocular muscles may subsequently develop weakness involving bulbar, limb, neck, or respiratory muscles.

Regarding disease onset, ocular symptoms were the most common initial manifestations, occurring in 66.7% of patients, whereas generalized onset and limb weakness accounted for 13.3% and 10.0%, respectively. Ptosis was also the most frequent clinical manifestation at the time of evaluation, occurring in 86.7% of patients, while diplopia and limitation of ocular motility were observed in 35.0% and 21.7%, respectively. Ocular involvement, particularly ptosis and diplopia, is a characteristic manifestation of MG and frequently occurs early in the disease course.^{1,2} Previous studies have reported that approximately half or more of patients with MG may initially present with ocular manifestations.⁷ In patients initially presenting with ocular MG, subsequent generalization is also well recognized, although reported rates vary considerably across studies. A recent systematic review and meta-analysis reported a pooled proportion of secondary generalization of approximately 39%, with substantial heterogeneity among studies.⁸

Although ocular symptoms predominated at disease onset in the present study, generalized MG accounted for 68.3% of patients at the time of evaluation, whereas 31.7% had ocular MG. Because this was a cross-sectional descriptive study, the present data cannot be used to determine the rate or timing of progression from ocular to generalized MG. Nevertheless, the difference between the distribution of symptoms at onset and disease type at evaluation illustrates the broad clinical spectrum encountered among patients with MG in clinical practice. The high proportion of generalized MG may also partly reflect the study setting, as Bach Mai Hospital is a tertiary referral center receiving patients requiring specialized neurological assessment and treatment.

Bulbar manifestations were also frequently observed. Dysarthria occurred in 60.0% of patients, while dysphagia and weak cough

were each present in 56.7%, and choking when drinking was reported in 55.0%. In addition, neck weakness, limb weakness, generalized weakness, and dyspnea were observed in 48.3%, 45.0%, 45.0%, and 40.0% of patients, respectively. These findings demonstrate that, in addition to the characteristic ocular manifestations, a substantial proportion of patients in this study had involvement of bulbar, axial, limb, and respiratory muscles. Bulbar and respiratory manifestations are particularly clinically relevant because they may compromise swallowing, airway protection, and respiratory function.^{1,3} Therefore, systematic assessment of these manifestations is important when evaluating the clinical severity of MG.

According to the MGFA classification, MGFA classes I-III accounted for 88.3% of patients, while classes IV-V accounted for 11.7%. MGFA classes I and IIb were the two most common categories, accounting for 31.7% and 26.7% of patients, respectively. The MGFA classification provides a standardized approach to describing the distribution and severity of muscle weakness and is widely used in clinical practice and research.⁹ In the present study, one-third of patients (33.3%) had a history of at least one myasthenic crisis, while 11.7% were experiencing a crisis at the time of the study. These findings indicate that severe exacerbations constituted an important component of the clinical spectrum in this hospitalized population. Myasthenic crisis is among the most serious manifestations of MG because severe bulbar and respiratory muscle weakness may result in respiratory failure and the need for ventilatory support.³ The relatively high proportion of patients with a history of crisis in our study may partly reflect the tertiary referral setting and the inclusion of hospitalized patients rather than a population-based MG sample.

The mean MG-ADL score was 9.02 ± 5.72 , with a median of 8.5 and a range of 0-24. Importantly,

patients classified as MGFA IV-V had significantly higher MG-ADL scores than those classified as MGFA I-III (19.29 ± 5.74 vs. 7.66 ± 4.15 ; $p < 0.001$). This finding indicates that limitations in activities of daily living were substantially greater among patients with more severe clinical manifestations. The MG-ADL is a simple and widely used instrument for evaluating the functional impact of MG symptoms on daily activities.¹⁰ The association observed between higher MGFA class and greater MG-ADL impairment is clinically plausible because the two measures capture related but distinct dimensions of disease burden. The MGFA classification primarily categorizes the distribution and severity of muscle weakness, whereas MG-ADL reflects the functional consequences of symptoms in daily life.^{9,10} Their combined assessment may therefore provide complementary information when characterizing the clinical status of patients with MG.

Regarding the selected ancillary findings, AChR-Ab was positive in 88.3% of patients. This finding is consistent with AChR-Ab being the most commonly detected autoantibody in MG and its important role in the pathogenesis and diagnosis of the disease.¹ MuSK-Ab positivity was uncommon, occurring in only two patients (3.3%). Given the very small number of MuSK-Ab-positive patients, the present study does not permit meaningful comparisons of clinical characteristics according to MuSK antibody status.

Thymic abnormalities were another notable ancillary finding. Thymoma without prior surgery was identified in 30.0% of patients, thymic hyperplasia in 3.3%, and 20.0% of patients had previously undergone surgery for thymoma. Thus, current or previous thymoma was frequently observed in this study population. Previous literature has generally reported thymoma in approximately 15-20% of patients with MG, although estimates vary according

to study population and methodology.⁴ The proportion observed in our study therefore appears relatively high compared with that generally reported in the literature.

Several factors may contribute to this difference. Most importantly, Bach Mai Hospital is a tertiary referral center, and the present study included hospitalized patients using convenience sampling. Patients with more complex clinical manifestations or thymic abnormalities may therefore have been preferentially referred and admitted, potentially increasing the observed proportion of thymoma. Consequently, the thymoma frequency observed in this study should be interpreted as a characteristic of the present hospital-based study population rather than as an estimate of thymoma prevalence among patients with MG in the general Vietnamese population. Nevertheless, the finding highlights the importance of evaluating thymic abnormalities as part of the ancillary assessment of patients with MG.

This study has several limitations. First, it was a single-center, descriptive cross-sectional study with a relatively small sample size and convenience sampling; therefore, the findings may not be representative of the broader population of patients with MG. Second, because the study was conducted among patients treated at a tertiary referral hospital, patients with generalized, severe, or clinically complex disease may have been overrepresented. This potential referral and selection bias should be considered when interpreting the proportions of generalized MG, myasthenic crisis, and thymoma observed in this study. Third, the cross-sectional design primarily allowed characterization of clinical and ancillary findings at the time of evaluation and did not permit assessment of longitudinal changes in disease severity or functional status.

In particular, although ocular symptoms were common at disease onset and generalized MG was common at evaluation, the study design did not allow determination of the proportion or timing of patients progressing from ocular to generalized disease. Finally, the small numbers of patients in some subgroups, particularly those with MGFA IV-V disease and MuSK-Ab positivity, limited further subgroup analyses. Despite these limitations, the study provides additional data on the clinical spectrum, disease severity, functional impairment, antibody status, and thymic abnormalities among patients with MG treated at a major tertiary referral hospital in Vietnam.

V CONCLUSION

Among patients with myasthenia gravis treated at Bach Mai Hospital in 2025-2026, females predominated, and ocular symptoms were the most common initial manifestations. Ptosis was the most frequent clinical manifestation. At the time of evaluation, generalized myasthenia gravis was more common than ocular myasthenia gravis, and bulbar, limb, neck, and respiratory manifestations were frequently observed. Most patients were classified as MGFA I-III; however, patients with MGFA IV-V disease had significantly greater impairment in activities of daily living, as reflected by higher MG-ADL scores.

Regarding ancillary findings, most patients were positive for AChR-Ab, whereas MuSK-Ab positivity was uncommon. Thymoma, either currently present or previously treated surgically, was also frequently observed in this hospital-based study population. Overall, these findings provide a description of the clinical characteristics, disease severity, functional impairment, and selected ancillary findings of patients with myasthenia gravis treated at a tertiary referral hospital in Vietnam.

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