

RARE CO-OCCURRENCE OF OCULAR MYASTHENIA GRAVIS IN HYPERTHYROIDISM: A CASE REPORT

Sanjog Kandel,¹ Shatdal Chaudhary,¹ Niraj Kumar Jaiswal,¹ Pushpa Raj Dhakal,¹ Aakash Shahi,¹ Manoj Karki¹

ABSTRACT

A rare clinical presentation of ocular myasthenia gravis (OMG) with thyroid disorders, has been reported and documented in the past. There is similarity in the presentation of patients with OMG and thyroid ophthalmopathy as a complication of thyrotoxicosis. The tendency of myasthenia gravis to get overlooked as separate entity despite having thyrotoxic presentation concomitantly necessitates knowledge, thorough examination, and an experienced approach, to aid in its diagnosis. We have discussed two cases in a thyrotoxic state, with symptoms of ocular myasthenia gravis and clinical approach in our setting.

KEYWORDS

Hyperthyroidism, Ocular myasthenia gravis, Ice pack test

1. Department of Internal Medicine, Universal College of Medical Sciences, Bhairahawa

<https://doi.org/10.3126/jucms.v11i02.58137>

For Correspondence

Dr. Sanjog Kandel
Department of Internal Medicine
Universal College of Medical Sciences
Bhairahawa, Nepal
Email: drsanjograj@gmail.com

INTRODUCTION

Myasthenia gravis (MG) is an autoimmune disease due to binding of autoantibodies to AchR and MuSK receptor proteins involved in neuromuscular junction (NMJ) signaling, leading to failure of neuromuscular transmission. As a result, nerve impulses cannot trigger muscle contractions.^{1,2} The pathological hallmark of MG is weakness of muscles that worsens after use and improves after rest. About 2/3rd of patients present with ocular symptoms that usually progresses to other muscles, resulting in generalized MG. In about 10%, symptoms remain limited to the ocular muscles called ocular MG.³ The incidence of MG is about 1 to 2 per 100,000 per year while the prevalence is estimated to be as high as 20 to over 50 per 100,000 in the population.⁴ It is seen in women than men in the second and third decades of life.⁵ Patients with MG may have coexisting autoimmune disorders like autoimmune thyroid diseases (AITDs).

Thyroid hormone is necessary for normal human development and functioning. Rennie G. described the co-occurrence of Graves' disease (GD) with MG for the first time in 1908.⁶ These coexisting diseases have been documented more frequently thereafter.⁷ The pathogenic link between these two autoimmune diseases is still unclear but an immunological cross-reactivity between the NM junction and thyroid components was found in overlapping thyrotoxicosis and MG.⁸ A report found that various thyroid disorders can be seen with MG including hyperthyroidism, hypothyroidism, nontoxic goiter, Hashimoto's thyroiditis and thyroid antibody-positive euthyroid condition.⁹

CASE REPORT 1

A 25-year-old female presented to the eye hospital with a history of sudden dropping of left eye lid since 3 days which progressively increased over last 1 day. She also complained of diplopia while looking forward. A positive history of headache, palpitation, weight loss of 7-8 kg and irregular menses was present in patient but no history of swallowing difficulty, no head tilt and gait abnormality. There was no history of diabetes mellitus, hypertension or any chronic illness to the patient. There was no family history of thyroid disorders, neuromuscular disorders or any significant ocular diseases. Patient is married for 3 years and having a single child with normal health.

Ocular examination revealed normal bilateral fundus with CD=0.3 bilaterally with bilateral ptosis (left>right). The downward movement of the left eye was restricted and the patient was complaining of diplopia during downward. Patient was positive on ice pack test and increased fatigability of eye. For these findings, patient was referred to general physician to rule out ocular myasthenia gravis. We evaluated this case at our center further.

On general survey, patient is thinly built and poorly nourished with pallor and flushing face. Vitals of the patient on medicine outpatient visit were pulse – 109/minute, regular, with normal volume and character, blood pressure – 130/70 mm of Hg. The patient was afebrile. Diffuse thyroid swelling was noticed during the examination. Systemic examination including neurological and all other systems documented no significant abnormality, except for decreased palpebral fissure of the left eye and lid lag noticed in the both eyes. Based on the history and examination findings, diagnosis

of ocular MG was made, and relevant investigations like thyroid function test, USG neck and acetylcholine receptor antibody (Ach-R Ab) was initially advised to the patient.



Figure 1. A, left sided ptosis; B, improvement with ice pack test

Thyroid function tests reported T3 levels of 6.36 (2.0- 4.2) pg/ml, T4 levels of 24.29 (8.9-17.2) pg/ml, and TSH levels of 0.081 micro IU/ml (0.3- 4.5). Ach-R Ab (IgG) was 0.11nmol/L (<0.40). Ultrasonography evaluation of thyroid showed diffusely enlarged bilateral lobes with increased heterogeneous echo texture with increased vascularity suggestive of thyroiditis. The haematological and other biochemical investigations were all within normal limits.

With all investigation findings, diagnosis of thyrotoxicosis status of the patient was made and carbimazole was started at a dose of 10 mg, thrice a day with propranolol 10 mg, twice a day. The patient was discharged with an advice to continue carbimazole and review after one month. Both symptomatic and biochemical improvement was noticed in one month follow-up i.e. improvement in ocular symptoms and T3, T4, and TSH levels were within normal ranges, respectively.

CASE REPORT 2

A 19-year-old female presented with a history of generalized weakness since 5 to 6 months progressive day by day with sudden dropping of upper eye lids (left> right) with bilateral painful eyes since 3 months with loss of extra-ocular movements and history of diplopia since 1 month. Furthermore, she also noticed swelling of neck for 4 months but was not painful. A positive history of headache, palpitation, weight loss of 5 kg and irregular menses was present in patient. There was no history of diabetes mellitus, hypertension or any chronic illness to the patient. There was no family history of thyroid disorders, neuromuscular disorders or any significant ocular diseases.

Ocular examination revealed bilateral mid dilated, reactive pupils and normal bilateral fundus with CD=0.3 bilaterally with bilateral ptosis. The downward movement of the both eyes were restricted and the patient was complaining of diplopia during downward gaze. Right medial and lateral rectus palsies were noted with no nystagmus. Patient was positive on ice pack test.

On general survey, patient was thin and poorly nourished. Vitals of the patient on medicine outpatient visit were pulse – 121/minute, regular, with normal volume and character, blood pressure – 120/70 mm of Hg. The patient was afebrile. Diffuse thyroid swelling was noticed during the examination. Systemic examination including neurological and all other systems documented no significant abnormality. Based on the history and examination findings, diagnosis of ocular MG was made, and relevant investigations like thyroid function test, USG neck and acetylcholine receptor antibody (Ach-R Ab) was initially advised to the patient.



Figure 2. A, bilateral ptosis; B, diffusely enlarged thyroid; C, improvement after treatment

Thyroid function tests reported T3 levels of 5.31 (2.0- 4.2) pg/ml, T4 levels of 21.75 (8.9-17.2) pg/ml, and TSH levels of 0.029 micro IU/ml (0.3- 4.5). Anti-TPO and TRAb with >300 (<60 IU/l) and 2.3 (<1IU/l) respectively. Ach-R Ab (IgG) was 0.21nmol/L (<0.40). Ultrasonography evaluation of thyroid showed diffusely enlarged bilateral lobes with increased heterogeneous echo texture with increased vascularity suggestive of thyroiditis. The haematological and other biochemical investigations were all within normal limits.

With all investigation findings, diagnosis of thyrotoxicosis status with ocular myasthenia gravis was made and carbimazole was started at a dose of 10 mg, thrice a day with propranolol 10 mg, twice a day. Complete clinical and biochemical recovery was noticed on 3 month follow-up. In both cases, standard treatment of hyperthyroidism has improved the symptoms of ocular myasthenia gravis and relapse has not been noted as both the cases are on a routine follow up.

DISCUSSION

Myasthenia gravis (MG) is an autoimmune disease impairing neuromuscular transmission in skeletal muscles due to circulating antiacetylcholine receptor autoantibodies. MG has variety of presentation ranging from a milder form such as ocular MG (OMG) to a severe generalized disease (GMG).¹⁰ Many patients with MG may have evidence of coexisting autoimmune thyroid diseases, which include autoimmune thyroiditis and Graves' disease.¹¹ Epidemiological studies have shown more common occurrence of AITD in MG patients i.e. approximately 5-10%, whereas a low incidence of MG, (0.2%) has been seen in AITD patients.¹²

Ocular presentation is most frequent among various forms of MG in patients with AITD whereas generalized form is more common among non-thyroid cases. Also, thymoma or thymic hyperplasia is less frequent in MG associated with AITD. Several hypotheses have been considered to link the casual relationship between OMG and AITD as definite relation has not been well understood. First, the basis of the association could be sharing of common epitope by both

thyroid and ocular muscles which have an immunological cross-reactivity.¹³ A common genetic background could be second reason for the co-incidence of both the autoimmune diseases.¹⁴ Human leukocyte antigen (HLA) specificity (B8, DR3, and BW46) between MG and thyroid disease has been reported. In 75% of patients with both conditions, thyrotoxic symptoms occur before or concurrently with those of myasthenia. Our patient had thyrotoxicosis symptoms 3 months before the ptosis developed.¹⁵

The ocular changes in Graves' disease may include exophthalmos, periorbital oedema, lid lag, chemosis and ophthalmoplegia. Exophthalmic ophthalmoplegia may be unilateral, but it is usually bilateral. Ptosis is generally not seen in thyroid ophthalmopathy, in contrast to MG. The extraocular muscles most commonly involved are the superior and lateral recti.¹⁶ In our patient, the downward movement of the right eye was restricted and the patient was complaining of diplopia during downward. Two thirds of the patients with both disorders show improvement in MG after treatment for thyroid disease which has been seen in our patient also. The treatment of hyperthyroidism has improved the myasthenic symptoms in our patient without treatment of anticholinesterase.

Some authors state that, thymectomy may have positive effects on the clinical condition of both myasthenia¹⁷ and ATID¹⁸ but our patient did show an obvious improvement after carbimazole therapy only. In conclusion, MG associated with thyrotoxicosis has a clinical expression with preferential involvement of the eye muscle characterized by bilateral ptosis. Detailed immunological and genetic studies need to be done further to verify these hypotheses.

REFERENCES

1. Peacey SR, Belchetz PE. Graves' disease: Associated ocular myasthenia gravis and a thymic cyst. *J R Soc Med.* 1993; 86:297-8.
2. Ratanakorn D, Vejjajiva A. Long-term follow-up of myasthenia gravis patients with hyperthyroidism. *Acta Neurol Scand.* 2002; 106:93-8.
3. Yeh HH, Tung YW, Yang CC, Tung JN. Myasthenia gravis with thymoma and coexistent central hypothyroidism. *J Chin Med Assoc.* 2009; 72:91-3.
4. Garlepp MJ, Dawkins RL, Christiansen FT, Lawton J, Luciani G, McLeod J, et al. Autoimmunity in ocular and generalized myasthenia gravis. *J Neuroimmunol.* 1981; 1:325-32.
5. Marino M, Ricciardi R, Pinchera A, Barbesino G, Manetti L, Chiovato L, et al. Mild clinical expression of myasthenia gravis associated with auto-immune thyroid diseases. *J Clin Endocrinol Metab.* 1997; 82:438-43.
6. Ali AS, Akavaram NR. Neuromuscular disorders in thyrotoxicosis. *Am Fam Physician.* 1980; 22:97-102.
7. Weetman AP, McGregor AM. Autoimmune thyroid disease: Further developments in our understanding. *Endocr Rev.* 1994; 15:788-830.

8. Bartley GB. Epidemiologic characteristics and clinical course of ophthalmopathy associated with auto-immune thyroid disease in Olmsted County, Minnesota. *Trans Am Ophthalmol Soc.* 1994; 92:477–588.
9. Roy A, Kalita J, Misra UK, Kar D, Agarwal A, Misra SK. A study of myasthenia gravis in patients with and without thymoma. *Neurol India.* 2000; 48:343–6.
10. Marino M, Ricciardi R, Pinchera A, Barbesino G, Manetti L, Chiovato L, Braverman LE, Rossi B, Muratorio A, Mariotti S. Mild Clinical Expression of Myasthenia Gravis Associated With Auto-immune Thyroid Diseases. *J Clin Endocrinol Metab.* 1997; 82:438–443. doi: 10.1210/jc.82.2.438.
11. Christensen PB, Jensen TS, Tsitopoulos I. Associated autoimmune disorders in myasthenia gravis. *Acta neurol Scand* 1995; 91:192-195
12. Peacey SR, Belchetz PE. Graves' disease associated with ocular myasthenia gravis and thymic cyst. *J Soc Med* 1993; 86:297-298.
13. Ludgate ME, Dong Q, Soreq FI, et al. The pathophysiological significance of a thyroglobulin-acetylcholinesterase shared epitope in patients with Graves' ophthalmopathy. *Acta Endocrinol (Copenh)* 1989; 121:38-45.
14. Weetman AP, McGregor AM. Autoimmune thyroid disease: further developments in our understanding. *Endocrinol Rev* 1994; 15:788 - 830.
15. Bartley GB. Epidemiologic characteristics and clinical course of ophthalmopathy associated with autoimmune thyroid disease in Olmsted County, Minnesota. *Transactions of American Ophthalmological Trans Am Ophthalmol Society* 1994; 92:477-588.
16. Laloux P, Mourain S, Buyschaert M. (Palpebral asymmetry and Graves' ophthalmopathy). (Article in French). *Acta Meurol Belg* 1987; 87:273-280.
17. Roy A, Ralita J, Misra UR, et al. A study of myasthenia gravis in patients with and without thymoma, *neurology India* 2000; 48:343-346
18. Degroot LJ, Perlo V, Gephart T, et al... Remission of myasthenia and thyrotoxicosis after thymectomy. *Ann Int Med* 1967; 67:1042-1044.