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Case Report

A case report of juvenile ocular myasthenia gravis in a toddler

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ABSTRACT

Myasthenia gravis (MG) is an acquired autoimmune disorder leading to abnormal fatiguability of muscles due to a deficiency of acetylcholine receptors (AChRs) caused by circulating antibodies directed against them. MG presents as ocular MG and generalised MG. We present a 1-year 9-month-old female child presenting with bilateral ptosis, worsening by the end of the day and improving with rest. On examination, pupillary reflexes were normal. Other cranial nerve examinations were normal. The child was one of the dizygotic twins. There was no similar history in the family members as well as the other twin. AChR antibodies assay was strongly positive. Chest X-ray revealed no thymus enlargement. The child was treated with neostigmine and prednisolone. Symptoms improved drastically; the child was discharged and is on regular follow-up. She did not have a relapse of symptoms on follow-up. We plan to taper steroids over the next 6 months and add on steroid-sparing agents.

Keywords: Myasthenia gravis, Acetylcholine receptors, Ptosis

INTRODUCTION

Myasthenia gravis (MG) is defined as an acquired autoimmune disorder where there is abnormal fatiguability of muscles due to a deficiency of acetylcholine receptors (AChRs) caused by circulating antibodies directed against AChR.[1] The most common antibodies are antibodies to nicotinic AChR. Antibodies affect the function by complement-mediated destruction of the motor end plate and internalisation of AChR antibodies.[2] Childhood MG has three types: Congenital myasthenic syndrome (CMS), transient MG, and Juvenile MG (JMG). JMG and CMS can be differentiated by the seropositivity of AChR antibodies. MG presents as ocular MG and generalised MG. Ocular MG is a form of MG clinically involving only the levator palpebrae superioris, the orbicularis oculi and the extraocular muscles. Ptosis and ophthalmoplegia, both unilateral and bilateral, constitute the only signs in about 20% of cases, whereas, in 80% of cases, ocular symptoms mark the onset of generalised MG.[1] Antibodies can also be directed against muscle-specific kinase (MuSK) and receptor-related low-density lipoprotein 4 (LRP4). MuSK antibodies act presynaptically by disrupting LRP4 function.[3] Cholinesterase inhibitors are used first-line as symptomatic treatment in JMG patients.

CASE REPORT

The one-year nine-month-old female child presented to our outpatient department with chief complaints of bilateral ptosis. Ptosis initially started on the left eyelid 4 weeks back, followed

by the right eyelid from the past 1 week, and was gradually progressive, better in the morning, and slowly worsening by the end of the day. At admission, the child had complete ptosis of the left eye associated with compensatory head tilt to the left side and partial ptosis of the right eye. There is no history suggestive of diplopia in this child. There is no history of similar illness in the family members as well as in the other twin. The child was one of the dizygotic twins of non-consanguineous marriage, first in birth order, born preterm (30 weeks), and delivered by emergency lower-segment caesarean section. The child had a stormy neonatal course with respiratory distress syndrome requiring surfactant, ventilator support, and other issues related to prematurity and had a neonatal intensive care unit stay for 2 months.

At admission, the child was conscious, alert, and oriented to time, place, and person. The child was hemodynamically stable with a heart rate of 102 bpm, respiratory rate of 20/min, blood pressure of 96/54 mmHg, and oxygen saturation of 96% in room air. Ocular examination revealed complete ptosis of the left eye and partial ptosis of the right eye with a 4 mm palpebral opening. Pupillary reflexes were intact. Other cranial nerves were normal. On motor system examination, power was normal in all four limbs, deep tendon reflexes were normal, abnormal cerebellar signs were absent, no bladder or bowel involvement. Other systems were within normal limits. Clinically, ocular MG was considered. Anti-AChR antibodies assay was done by enzyme-linked immunosorbent assay method and came to be strongly positive. Magnetic resonance imaging brain was normal. There is no evidence of thymoma on chest X-ray.

The child was started on neostigmine 1 mg/kg/day in three divided doses and prednisolone 1 mg/kg/day in two divided doses. The ptosis resolved completely, and the child was discharged after 2 days on neostigmine and prednisolone. The child was on regular follow-up, and prednisolone was tapered to 0.5 mg/kg/day on the first visit. The last hospital visit was 1 month back; no relapse of symptoms was noted.

Muscarinic side effects were not present during follow-up.

We plan to follow up with the child regularly and start on steroid-sparing agents (azathioprine) on the next visit and taper the steroids over the next 6 months. The child will be continued on neostigmine and azathioprine till remission.

DISCUSSION

We describe a case of JMG with ocular symptoms in a female child.

Ashraf *et Al.,* in their longitudinal study, described that JMG has less prevalence, higher incidence of ocular MG, equal sex ratio, and increased familial occurrence compared to adult MG. This study also revealed that JMG has a lower rate of seropositivity, lack of association of thymoma and other autoimmune disorders and more chances of complete remission.[4]

Peeler *et al*. in his, in their observational cohort, described an association between high AChR antibodies and progression from ocular myasthenia gravis (OMG) to generalised disease.[5] In this case report, the child had strongly positive antibodies at a younger age. There could have been a high incidence of generalised disease, thus resulting in higher mortality and morbidity if not diagnosed early.

Namba *et al*. reveals increased familial incidence of JMG and occurrence of disease in both members of monozygotic twins, but none of the dizygotic twins are affected. This study highlights the genetic role in the pathogenesis of MG probably autosomal recessive inheritance.[6] According to this study, the other twin had no risk of MG and was not evaluated.

A study by Monsul *et al*. suggested that early use of steroids may decrease the progression of OMG to generalised MG.[7] A randomised, double-blind trial by Palace *et al*.[8] suggested that a combination of prednisolone on alternate days with azathioprine in AChR-positive generalised MG patients reduces the maintenance dose of prednisolone and associated with reduced incidence of treatment failures, longer remission and fewer side effects.

Skeie *et al*.,[9] recommend mycophenolate mofetil, tacrolimus (FK506) may be used as second-line immunosuppressive drugs. Plasma exchange and intravenous immunoglobulin are equally effective and are recommended as a short-term treatment to induce remission in MG exacerbations. Thymectomy (TE) should be done irrespective of severity of MG if a thymoma is detected. TE increases the chances of remission and clinical improvement in non-thymomatous autoimmune MG.[9]

The latest therapeutic approaches in MG include (a) Rituximab-monoclonal antibody to CD 20 useful in refractory MG. Experimental treatments tested in animal model of MG experimental autoimmune MG includes (a) tumour necrosis factor-α inhibitors like etanercept, (b) complement inhibitors, (c) modulation of AChE expression by the use of oral antisense oligonucleotides which causes inhibition of targeted gene transcription, (d) cellular therapy, (e) specific removal of anti-AChR antibodies and (f) reduction of AChR modulation at neuromuscular junction.[10]

CONCLUSION

Juvenile Ocular Myasthenia Gravis is a rare and often overlooked condition. Pediatric patients presenting with ptosis or strabismus should prompt suspicion of childhood MG. Notably, familial incidence has been reported, emphasizing

the importance of vigilant monitoring of siblings, particularly in twin cases. Early recognition and diagnosis are crucial, as timely intervention with appropriate treatment significantly improves prognosis and decreases the risk of amblyopia.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

Patient consent not required as the patient's identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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