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Case report

Excessive daytime sleepiness in a patient with coexisting myotonic dystrophy type 1, myasthenia gravis and Graves' disease



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ABSTRACT

A 41-year-old female with history of Graves' disease, bilateral cataract, paroxysmal atrial fibrillation was admitted because of muscle weakness, daytime sleepiness, fatigability, drowsiness, bilateral eyelid ptosis, descending of head and lower jaw. On neurological examination the patient was presented with muscle weakness, muscle atrophy (in face and sternocleidomastoid muscles), features of myotonia and apocamnosis (orbicular muscles). Electromyography revealed myopathic changes, myotonic and pseudomyotonic discharges, positive repetitive nerve stimulation test in proximal muscles. Myotonic dystrophy (MD) diagnosis was confirmed by genetic testing and myasthenia gravis (MG) by a positive titer of cholinergic receptor autoantibodies. In the CSF concentration of hypocretin was significantly decreased.

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1. Introduction

Myasthenia gravis (MG) and myotonic dystrophy (MD) lead to a dysfunction of motor unit, although they both differ clinically and pathogenetically. Coincidence of MG and MD in one patient is extremely rare [1–6].

Hyperthyroidism may also lead to muscle dysfunction [7,8]. Though endocrine disorders like hypogonadism or glucose intolerance are typical for MD patients, hyperthyroidism is rarely reported in these subjects [7,8]. However in MG, Graves'

disease, which is another autoimmunological disorder, is diagnosed more often than in general population [9].

To the best of our knowledge, coexistence of MD, MG and Graves' disease in one patient has never been reported and it is the first case report describing such a patient.

2. Case report

A 41-year-old female farmer with one-year history of Graves' disease was referred to the Department of Neurology with a

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suspicion of MG. She complained of bilateral eyelid ptosis, decreasing of her head and a lower jaw, and reported also muscle weakness, fatigability and drowsiness making walking long distances impossible. The patient had a history of bilateral cataract (already treated surgically in her both eyes) and biliary calculosis. She complained of cardiac arrhythmia (diagnosed as paroxysmal atrial fibrillation) and frequent respiratory tract infections. She had a history of respiratory insufficiency in the postoperative period after appendectomy. There had been cases of cataract and muscle weakness in the patient's family that were reported by her but not extensively diagnosed: her uncle and aunt had difficulties with walking. They died in their middle age of an unknown reason, leaving no descendants. Our patient's mother was operated on bilateral cataract at the age of 50. She did not complain of any muscle weakness and she died at the age of 76 because of a neoplasm, which might have been a case of a mild type of MD with a leading symptom of bilateral cataract, as it is known that myotonia and muscle dystrophy are not always present in that type of MD [10,11].

Our patient has three children and two of them (a 13-year-old son and 21-year-old daughter) do not report any health problems. Neurologic examination did not revealed any abnormalities. Her 17-year-old son is moderately mentally impaired with a signs of myotonia seen on neurological examination. His EMG examination showed a presence of a myopathic process and myotonic and pseudomyotonic discharges in tibialis anterior and extensor digitorum muscles. Decrement test from both proximal and distal muscles was normal. We diagnosed him with a childhood type of MD, where learning difficulties are the early sign followed by myotonia and muscle atrophy [10,11].

On admittance, the patient was presented with generalized muscle weakness, muscle atrophy – especially in her face and sternocleidomastoid muscles and features of myotonia (difficulty with grip release). There was apocamnosis seen in orbicular muscles of her eyes, but it was difficult to evaluate in hand muscles. She was hyperthyreotic. Her twenty-four hour glycaemic profile, cortisol secretion and synacthen test were normal.

Electromyography revealed myopathic changes (low-amplitude, short-duration, polyphasic motor unit potentials) with significant spontaneous activity consisting of both myotonic and pseudomyotonic discharges (Fig. 1a and b). Repetitive nerve stimulation was negative in distal hand muscles but positive (resulting in significant decrement in successively evoked muscle action potentials) in proximal deltoid muscles (Fig. 2). An edrophonium test was clinically and electrophysiologically positive. Her mediastinum CT did not reveal any changes coherent with a persistent thymus and/or a thymoma.

MD diagnosis was confirmed by genetic testing performed at Department of Human Genetics, University of Ulm, Germany which revealed mean number of 735 (ranging from 535 to 935) CTG triplet copies in locus 13.2 of chromosome 19q. MG diagnosis was confirmed by a positive titer of ACh receptor autoantibodies – 4.03 nmol/l (normal range – below 0.25 nmol/l). Based on her medical history, neurological and electrophysiological examination the patient was diagnosed with Graves' disease, MD and MG.

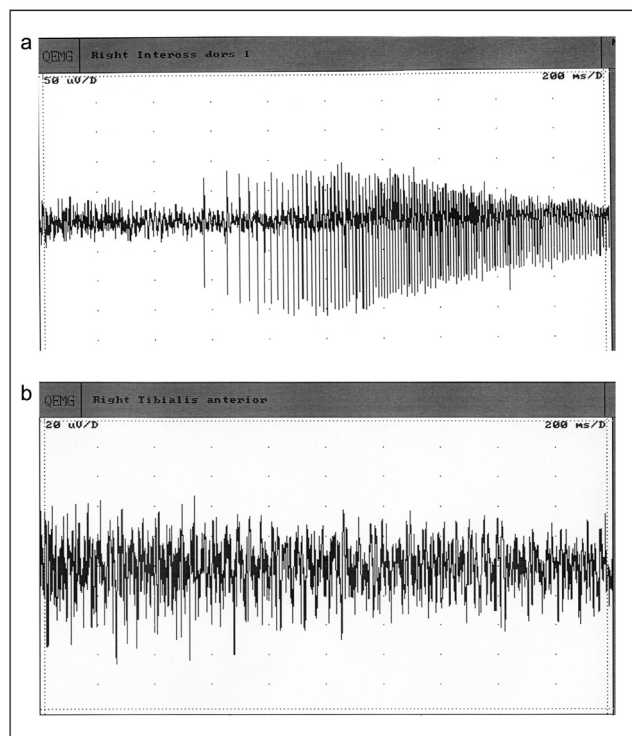


Fig. 1 – (a) Myotonic discharge seen in patient's right first dorsal interosseous muscle. (b) Pseudomyotonic discharge seen in patient's right anterior tibial muscle.

Because of an excessive daytime sleepiness (15 points Epworth scale [12]), CSF/serum analysis was done, showing unaltered total protein concentration normal cell count as well as albumin, IgG, IgA, and IgM CSF/serum concentration quotients. Isoelectrofocusing revealed identical bands pattern, confirming lack of intrathecal IgG synthesis. Nevertheless, decreased concentration of hypocretin concentration (80 pg/ml; normal range >100 pg/ml) was found, which may be connected with excessive daytime sleepiness present in our patient.

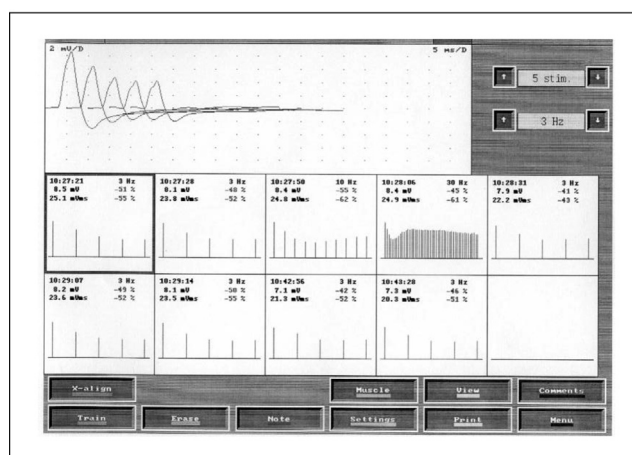


Fig. 2 – Decrement seen on repetitive nerve stimulation test in the patient's right deltoid muscle.

MG was treated with an acetylcholinesterase inhibitor – pyridostigmine (180 m daily). Pharmacological treatment of hyperthyreosis with methimazole and propylthiouracil was not effective and that is why the patient was treated with radioactive iodine I 131 with good results. A treatment with pyridostigmine and normalization of thyroid gland endocrine function resulted in a partial improvement of patient's general condition (an improvement of muscle strength, lesser muscle weakness and better walking dexterity) with no change in myotonic signs. An EMG examination carried out while the patient was in euthyreosis showed changes typical for both MG and MD.

The patient was monitored regularly by a neurologist and an endocrinologist in our outpatient facility. Her general medical state has not changed for the last year.

3. Discussion

It is estimated that a coincidence of MG and MD in one patient is 1 per 700 million people [1]. We have found six case reports describing a patient diagnosed with both MG and myotonic disorders [1,6]. Schoen described a case of a 13-year-old girl with MD, who developed symptoms of MG [1]. Matsumoto et al. reported a case of a 32-year-old patient diagnosed with MG and myotonia [2]. Two case reports described myotonic dystrophy type 1 coexisting with myasthenia gravis and thymoma [4,5]. Several reports described a coincidence of MD and MG in one family [3]. Based on present knowledge on MD and MG it seems there is no significant pathogenetic link between those two diseases and their coincidence is probably incidental [3].

Apart from having both MD and MG, in the patient reported Graves' disease was diagnosed. Hyperthyreosis potentiated muscle weakness caused by MG and MD [8] and an achievement of euthyreosis resulted in alleviating of thyrotoxic myopathy symptoms. Muscle fatigability was decreased by introducing an acetylcholinesterase inhibitor. Treatment with pyridostigmine did not intensify myotonia, what was also noted by Schoen [1].

Hyperthyreosis is diagnosed in about 5% of myasthenic patients [13]. Thyroid gland hormones are usually within normal range in patients with MD, although endocrinological disturbances are quite common in a course of MD. We have found only several published reports describing coincidence of hyperthyroidism and myotonic dystrophy [8].

Because of patient's excessive daytime sleepiness the CSF examination was done showing decreased hypocretin. Measurement of CSF hypocretin in patients with myotonic dystrophy has shown a significantly lower level in 6 patients with myotonic dystrophy, suggesting a dysfunction of the hypothalamic hypocretin system [14]. Therefore, Ciafaloni et al. did not observe low hypocretin levels in any of 38 MD 1 diagnosed patients [15] and based on this study a hypothesis about different pathogenetic background of a narcolepsy in MD1 was proposed. In myotonic dystrophy, weakness and myotonia of the upper airway and other respiratory muscles, as well an inherited membrane abnormality involving the respiratory and hypnogenic neurons in the brainstem, may be responsible for excessive daytime sleepiness. Many patients with myotonic dystrophy have been described with central

and upper airway obstructive sleep apneas, alveolar hypoventilation and daytime fatigue [16,17].

We think that the patient reported here is an interesting case showing that dysfunction of a neuromuscular system might have complex pathophysiologic and genetic background. Although extremely rare, such a combination of pathophysiologic pathways, as this reported here, might point at some common mechanisms of these, currently treated as completely distinct, neuromuscular disorders.

Conflict of interest

None declared.

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Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals.

REFERENCES

- [1] Schoen RT. Myasthenia gravis and myotonic dystrophy in a 13-year-old girl. *Neurology* 1977;27:546–9.
- [2] Matsumoto H, Sugiyama T, Ito M. Occurrence of myasthenia gravis in a patient with congenital myotonia. *J Neurol Sci* 1982;57:83–8.
- [3] Maytal J, Spiro AJ, Sinnar S, Moshe SL. The coexistence of myasthenia gravis and myotonic dystrophy in one family. *Neuropediatrics* 1982;18:8–10.
- [4] Feyma T, Carter GT, Weiss MD. Myotonic dystrophy type 1 coexisting with myasthenia gravis and thymoma. *Muscle Nerve* 2008;38:916–20.
- [5] Ekmekci O, Karasoy H, Bademkiran F, Akkus DE, Yuceyar N. Myasthenia gravis and thymoma coexisting with myotonic dystrophy type 1. *Neuromuscul Disord* 2014;24:40–2.
- [6] de los Angeles Avaria M, Kleinstein K, Novoa F, Faundez P, Carvallo P. Myotonic dystrophy in a female with myasthenia gravis. *Pediatr Neurol* 2007;36:421–3.
- [7] Fukazawa H, Sakurada T, Yoshida K, Kaise N, Kaise K, Nomura T, et al. Thyroid function in patients with myotonic dystrophy. *Clin Endocrinol* 1990;32:485–90.
- [8] Pagliarini S, Spagnuolo E, Ambrosone L, Barbato A, Tesaro P, Rambaldi M. Hyperthyroidism and Addison's disease in a

- patient with myotonic dystrophy. *Arch Intern Med* 1985;145:919–20.
- [9] Tanwani LK, Lohano V, Ewart R, Broadstone VL, Mokshagundam SP. Myasthenia gravis in conjunction with Graves' disease: a diagnostic challenge. *Endocr Pract* 2001;7:275–327.
- [10] Harley HG, Rundle SA, MacMillan JC, Myring J, Brook JD, Crow S, et al. Size of unstable repeat sequence in relation to phenotype and parental transmission in myotonic dystrophy. *Am J Hum Genet* 1993;52:1164–74.
- [11] Koch MC, Grimm T, Harley HG, Harper PS. Genetic risks for children of women with myotonic dystrophy. *Am J Hum Genet* 1991;48:1084–91.
- [12] Johns MW. A new method for measuring daytime sleepiness: the Epworth Sleepiness Scale. *Sleep* 1991;14:540–5.
- [13] Abrams GM, Zimmerman EA. In: Rowland LP, editor. *Merritt's neurology*. Philadelphia: Lippincott Williams & Wilkins; 2000. p. 849–64.
- [14] Martínez-Rodríguez JE, Lin L, Iranzo A, Genis D, Martí MJ, Santamaria J, et al. Decreased hypocretin-1 (Orexin-A) levels in the cerebrospinal fluid of patients with myotonic dystrophy and excessive daytime sleepiness. *Sleep* 2003;26:287–90.
- [15] Ciafaloni E, Mignot E, Sansone V, Hilbert JE, Lin L, Lin X, et al. The hypocretin neurotransmission system in myotonic dystrophy type 1. *Neurology* 2008;15(70):226–30.
- [16] Fermin AM, Afzal U, Culebras A. Sleep in neuromuscular diseases. *Sleep Med Clin* 2016;11:53–64.
- [17] Hansotia P, Frens D. Hypersomnia associated with alveolar hypoventilation in myotonic dystrophy. *Neurology* 1981;31:1336–7.