Turkish Journal of Medical Sciences

Volume 40 | Number 1 Article 24

1-1-2010

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Case Report

Turk J Med Sci
2010; 40 (1): 155-158
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E-mail: medsci@tubitak.gov.tr
doi:10.3906/sag-0812-27

Four cases of myotonia congenita in a Turkish family*

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Abstract: Myotonia congenita is a rare muscular disorder with autosomal dominant or autosomal recessive inheritance, and is characterized by painless myotonia.

A 44-year-old mother presented at our clinic with a son and a daughter, all sharing the same complaints of difficulty in relaxing their hands and beginning to walk, and spasms during chewing. The family had also another 16-year-old daughter, but she had no such complaints. The mother reported that her father and 2 sisters had the same disease, but that her brother was healthy. Their pedigree analysis revealed that the disease was present for 3 generations and had an autosomal dominant trait.

During the neurologic examination of cases, action and percussion myotonia were observed in the hand, arm, and leg muscles. Her asymptomatic daughter had also generalized myotonia. Needle electromyography of all cases revealed generalized myotonic discharges in the muscles examined. The cases are presented due to the presence of MC in 3 generations of the family. This case study reveals that EMG studies are useful in determining myotonic disorders in asymptomatic cases.

Key words: Myotonia, Thomsen's disease, autosomal dominant inheritance

Bir Türk ailesinde dört konjenital myotoni olgusu

Özet: Konjenital myotoni, otozomal dominant veya otozomal resesif kalıtılan nadir bir kas hastalığıdır ve ağrısız myotoni ile karakterizedir.

Kırk dört yaşında anne ile ailenin bir erkek ve bir kız çocuğu ellerini gevşetmede güçlük, yürümeye başlamakta zorlanma ve çiğneme sırasında tutukluk şikayetleri ile kliniğimize başvurdu. Ailenin 16 yaşındaki diğer kız çocuğunun herhangi bir yakınması yoktu. Anne, babası ve iki kız kardeşinin benzer hastalığı olduğunu, fakat erkek kardeşinin ise sağlıklı olduğunu bildirdi. Soy ağacı analizi hastalığın üç kuşaktır devam ettiğini ve otozomal dominant geçişli olduğunu gösterdi.

Olguların nörolojik muayenesinde eller, kol ve bacak kaslarında aksiyon ve perküsyon miyotonisi gözlendi. Asemptomatik kız çocuğu da jeneralize miyotoniye sahipti. Tüm olguların iğne elektromyografisi muayene edilen kaslarda yaygın myotonik deşarjlar ortaya çıkardı. Olgular, ailenin üç kuşağında konjenital myotoni olmasından dolayı sunuldu. Bu olgu çalışması, asemptomatik olgularda myotonik hastalıkların belirlenmesinde EMG çalışmalarının da faydalı olduğunu ortaya koymaktadır.

Anahtar sözcükler: Myotoni, Thomsen hastalığı, otozomal dominant kalıtım

Introduction

Myotonia congenita (MC) is a disease with autosomal dominant or recessive inheritance, characterized with myotonia of skeletal muscles. In both types, an abnormality of the chloride channels in the skeletal muscle membranes is thought to be responsible. The autosomal dominant form is also called Thomsen's disease and begins usually in infancy

Received: 24.12.2008 – Accepted: 08.09.2009

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* Presented in part at the 13th European Congress of Clinical Neurophysiology 4-8 May 2008, İstanbul, TURKEY.

or early childhood. Some cases can be diagnosed at later ages (1-5). Clinically, it presents with myotonia and muscle hypertrophy. There is a generalized involvement from the beginning. The disease shows no progression or muscle dystrophy. In the recessive type, there is a later onset. There is a temporary weakness phenomenon, and progresses superiorly from the legs (3,7,10). The dominant type has a lower prevalence than the recessive (2,6,10). Here, we described 4 cases of MC with a dominant trait.

Case Presentation

Case 1: The 44-year-old woman is the mother of the 3 patients. She presented at our outpatient clinic complaining about difficulty in relaxing her hands when gripping, difficulty in starting to walk or run, stiffness at the onset of chewing, and delay in opening her eyes. Her complaints were present for a long time; she reported that they were evident by the age of 20. She had never sought treatment from a physician previously for her complaints as they did not cause significant loss of function. She described weakness and fatigue over the previous 5 to 6 months. She reported that the vision of her left eye was blurred for the last 1 year. During her neurological examination, action myotonia was detected in the eyelids, hands, and masseters following voluntary contractions. There were generalized percussion myotonias in the tongue, arm, and leg muscles. There was neither a motor deficit nor a muscle hypertrophy. Her speech was mildly nasonated, and a cataract was detected in her left eye. No other neurological or systemic positive sign was evident.

Case 2: The 23-year-old male patient is the first child of the family. He had complaints similar to those of his mother. He had had these complaints since childhood, but they had become more evident in the previous 2 years. Especially, he had difficulty in relaxing his hands when grip, stiffness during chewing, and delayed opening of his eyes when they were closed. During his neurological examination, action myotonias were observed in his skeletal muscles following voluntary contractions, and percussion myotonias appeared in the tongue and extremity muscles when tapped. No muscle weakness was observed. He had an athletic appearance with his hypertrophied muscles. Aside from these, he had no other neurological abnormality.

Case 3: The 23-year-old female patient is the second child of the family. She presented to our outpatient clinic with complaints similar to those of her mother and brother. This patient also was complaining about difficulty in relaxing her hands when gripping, difficulty in opening her eyes, and stiffness at the beginning of walking and during chewing. Her neurological examination revealed no neurologic sign other than action and percussion myotonias.

The third child of the family died 8 h after being born.

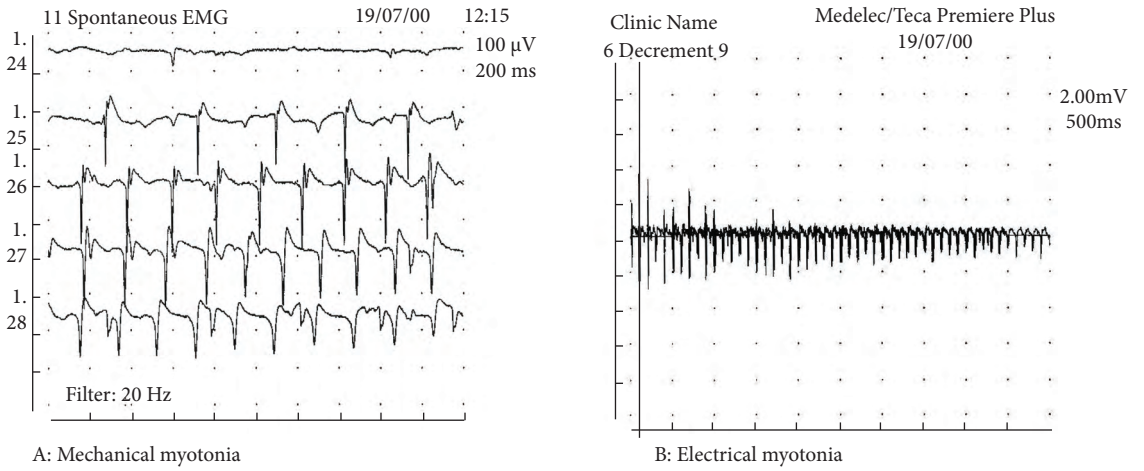
Case 4: The 16-year-old female patient is the fourth child of the family. She had no neurological complaint until her admission due to the presence of MC in her mother and siblings. During her neurological examination, action and percussion myotonias were observed.

The systemic examinations of all cases revealed no abnormality except for the presence of cataract in the first case. Their myotonias were not exacerbated by cold.

The hemograms, electrolyte levels, blood glucose, hepatic and renal function tests, TSH, T3, T4 levels and ECGs of all cases were normal. The only abnormality was the elevations in CPK (204 U/L, 229 U/L, 647 U/L, and 533 U/L, respectively).

During their electrophysiologic examinations, the motor and sensory nerve conductions and motor unit action potentials of all cases were normal. Interference patterns were observed during maximal voluntary contractions. Needle EMGs were performed in the proximal and distal muscles of both upper and lower extremities and the cranial muscles. In all muscles there were myotonic discharges associated with spontaneous bursts of high-frequency and high-amplitude electrical discharges on EMG (Figure 1).

From their family histories, it was learned that the mother's father and her 2 sisters also had the same disease. The pedigree of the family is shown in Figure 2. As can be understood from the pedigree, the type of MC observed in the mother, her son and 2 daughters is autosomal dominant.



A: Mechanical myotonia

B: Electrical myotonia

Figure 1. Myotonic discharges provoked by moving the needle electrode (A) and electrical stimulation (B).

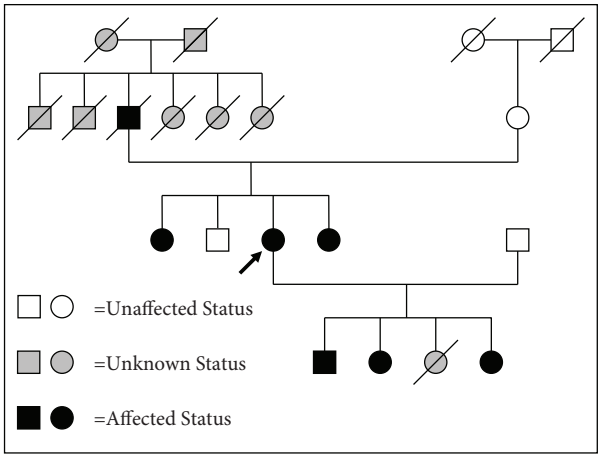


Figure 2. The pedigree of the family.

Many patients with myotonia can cope with their symptoms without the use of medications. Since the mother had some functional impairment, she was treated with mexiletine 200 mg twice daily. Her last follow-up appointment occurred 2 months after she had commenced medication: she reported improvement in her condition particularly with regard to her stiffness, and she had experienced no adverse side effects from her medication. She was, therefore, continued on the same dose of mexiletine. No antimyotonic drugs were given to her children because of their daily activity without restriction.

Discussion

MC is a hereditary muscle disease without muscle dystrophy or progression. The disease can be inherited either via autosomal dominant or autosomal recessive trait. The autosomal dominant form was described for the first time by Thomsen in himself and 4 generations of his family in 1874. Later, Leyden reported a patient of myotonia as the first description of the recessive form. In 104 of the 142 families examined by Becker, an autosomal recessive trait was observed, and the autosomal recessive type was reported to be predominant (10). In this country, where consanguineous marriages are abundant, MC is more commonly of the autosomal recessive type (9), and is more commonly seen in males (1,2,10). In our cases, there were no consanguineous marriages for 3 generations. As can be seen in the family pedigree, the 2 sisters and the father of the first patient and also her 1 son (the second case) and her 2 daughters (the third and fourth cases) had MC. That is, the inheritance was autosomal dominant in this family. As the third child of the first patient had died shortly after the birth, we cannot say if this child had MC or not. The autosomal dominant form of MC manifests in infancy or childhood. Myotonia is generalized from the beginning. Lack of weakness is characteristic of this disease (1,10). Likewise, in none of our cases there was motor weakness. As "temporary weakness phenomenon" is observed in the autosomal recessive

type, its absence was supportive of the diagnosis of autosomal dominant form. In our cases, the absence of motor weakness and functional deficits has been the cause of their late admission to our clinic. The fourth case did not even apply for her disease, but she was invited for examination due to the presence of autosomal dominant MC in her family. Some patients of autosomal dominant MC might have an athletic appearance simulating the autosomal recessive form, and in our cases only one patient (case 2) had an athletic appearance.

The sensitivity of EMG in detecting electrical myotonia in the cases of myotonic syndromes is especially high in adults, although it is not a completely sensitive test (1-3). In a previous study, it was reported that myotonic discharges were detected in at least one parent of the heterozygotic carriers, with a rate of 65% (9). In our cases, generalized myotonic discharges have been observed in the face and extremity muscles. Such myotonic discharges of these muscles were also present in the asymptomatic fourth case. No other routine laboratory test other than EMG is helpful in the diagnosis of MC. Only creatinine phosphokinase can be mildly elevated as in our cases (1).

In the differential diagnosis, autosomal dominantly inherited paramyotonia congenita and myotonic dystrophy must be considered. In paramyotonia congenita, there are repetitive contractions or muscle stiffness increasing with exercise. Myotonia has a tendency to be present primarily in the face, neck, and hand muscles. This can be provoked by cold, and also an attack of weakness can develop. Myotonic dystrophy is a progressive multi-system disease characterized by muscle dystrophy, cataracts, cardiac arrhythmias, testicular atrophy, and endocrine abnormalities (1-3,8). In our cases, no paradoxical myotonia was observed and application of cold did not cause any significant alteration. None of our patients had a systemic disorder. Only the first patient had a cataract in her left eye. The presence of cataract in the first patient along with the autosomal dominant inheritance of the disease in the family suggested the diagnosis of proximal myotonic myopathy. However, proximal muscle weakness, myotonia, and muscle pains without the involvement of facial muscles along with the presence of cataracts are required for the diagnosis of this disease; therefore, this diagnosis is unlikely (7). Although the diagnosis of MC is usually made with clinical presentation and EMG, a definite diagnosis requires genetic tests. Likewise, it was shown that dominant and recessive forms of MC are due to the mutations of genes on the seventh chromosome coding for chloride channel, in 1992 (4). However, we were unable to perform a genetic test due to technical problems.

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