Case Report

Oromandibular Dystonia Secondary to Methylphenidate: A Case Report and Literature Review

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Abstract

Methylphenidate (MTP) is a first-line treatment for attention-deficit hyperactivity disorder (ADHD) in children and adults and as a second-line treatment for narcolepsy in adults. We report a case of a young adult male who presented with abnormal orofacial movements after MTP use for the management of ADHD. Laboratory tests were within normal limits. His family history was unremarkable and negative for neurological diseases. A dose of MTP was given during the neurological examination, and abnormal facial movements suggestive of oromandibular dystonia (DTN) were observed. MTP was withdrawn and the symptoms recovered. The oromandibular DTN secondary to MTP probably occurs due to influences in the dopaminergic pathway, and these dyskinetic movements may be associated with a disbalance state of the dopamine, in which an increase or decrease of this neurotransmitter could lead to abnormal movements.

Keywords: Dystonia, methylphenidate, oromandibular dystonia, tongue movements

Introduction

Drug-induced movement disorders are usually associated with antipsychotic drugs. Neuroleptics are the most common cause of dystonia (DTN). Among these are the antiemetics that block central dopamine receptors, lithium, selective serotonin reuptake inhibitors, stimulants, and tricyclic antidepressants.[1]

Methylphenidate (MTP) hydrochloride was approved in 1955 by the Food and Drug Administration. It is first-line management for attention-deficit hyperactivity disorder (ADHD) in children and adults and as a second-line treatment for narcolepsy in adults.[2] In this context, MTP is a stimulant medication that is commonly associated with significant central nervous system side effects.[3] Insomnia and nervousness are the most commonly reported adverse effects, and other frequent complaints are related to the cardiovascular system such as tachycardia and palpitations. Furthermore, there have been reported cases of sudden death in both children and adults with a preexisting structural cardiac abnormality.[2]

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Orofacial DTN is a rarely described adverse effect in association with single-dose MTP.[4] DTN due to MTP treatment has generally been reported during combined treatments with antiepileptic and other psychotropic drugs.[5] Herein, we will report a case of a young adult that was only using MTP and developed abnormal tongue movements.

Case Report

An 18-year-old male presenting with orofacial abnormal movements was admitted to our hospital. He reported a diagnosis of ADHD since he was 9 years old, with feelings of inappropriate running, difficulty playing in silence, seems to be always on the move and talking excessively. Furthermore, his parents complained that he cannot hold his attention for the past 5 years with failing to follow through, seeming not to listen even when directly addressed, and difficulty organizing activities. His parents stated that even though he had a previous

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diagnosis of ADHD, he never used any medication and lost the follow-up in the psychiatric clinic.

Two days ago, the patient had a psychiatric appointment because the symptoms of ADHD were not been controlled with only behavioral adjustment, and he was struggling with the university classes. Laboratory tests were within normal limits. An electrocardiogram was normal. MTP 10 mg PO once a day was started.

After 3 days, the patient returned complaining of abnormal tongue movements. An improvement of attention-related processes was observed. However, he reported that about 1 h after every dose of the medication, his tongue seemed to have rolling movements. Besides, his parents stated that when they gave in another time the medication, tongue movements started again. His family history was unremarkable and negative for neurological diseases. On neurological examination, he had Grade 5 strength diffusely, normal deep tendon reflexes, and the absence of pyramidal signs, tremor, or bradykinesia. A dose of MTP was given during the examination, about 30 min after it was observed tongue movements, which were sustained with intermittent muscle contractions causing abnormal and repetitive movements suggestive of DTN. No other involuntary movements were present. MTP was withdrawal. The patient was referred to a psychiatric clinic, and the follow-up was lost.

Discussion

ADHD is the most common neurodevelopmental disorder, which is characterized by inattentiveness and hyperactivity/impulsivity. MTP improves ADHD symptoms and is currently considered the first-choice medication. In this context, MTP is a stimulant with a duration of action of approximately 1 h

Table 1: Literature review of the dystonia associated with methylphenidate use

Reference	Year	Age/sex	DTN features	Management
Fann	1966	Report of two patients that had DTN by phenothiazines and the use of MTP improved the symptoms		
Rylander	1972	It is considered the first report of DTN secondary to MTP, which occurred in an addicted patient		
Husain *et al*.	1980	3/male	OMD	MTP was withdrawal and diphenhydramine started with improvement of symptoms. In attempting reintroduction of MTP, he developed DTN again, and the medication was discontinued
Gay and Ryan	1994	14/male	Generalized (paroxysmal kinesigenic DTN)	MTP was withdrawal and carbamazepine started with symptoms resolution
Boogerd and Beijnen	2000	Report of a 44-year-old female with cerebral palsy and cervical DTN who used MTP and the symptoms improved		
Senecky *et al*.	2002	6/female	OMD	The medication was withdrawal with symptoms resolution
McLaren *et al*.	2010	Report of a child treated with aripiprazole + MTP who experienced OMD when MTP was discontinued		
Yilmaz *et al*.	2012	7/male	Apparently, OMD associated with dyskinetic movements of extremities	MTP was withdrawal and the symptoms had completely disappeared on the second day of admission
Waugh	2013	2/male	Cervical DTN (torticollis) + OMD	He accidental ingested MTP. Diphenhydramine was started and the symptoms recovered
Eftekhari *et al*.	2015	Report of three individuals with refractory DTN unresponsive to standard managements who experienced a response to oral MTP		
Guler *et al*.	2015	Report of a child treated with risperidone + MTP who experienced OMD when MTP was discontinued		
Tekin *et al*.	2015	15/female	Focal DTN (right upper limb)	She had severe pain associated with the DTN. Biperiden and diazepam were started and the symptoms recovered. MTP was withdrawal
Pérez *et al*.	2016	13/male	Painful cervical DTN	He was in the use of risperidone + oxcarbazepine + MTP; the DTN occurred when the risperidone was being discontinued. He was treated with diphenhydramine, benztropine, clonidine, and lorazepam, but his symptoms continued. Risperidone was restarted and the symptoms resolved
Grau-López *et al*.	2017	Report of a young adult male treated with risperidone + MTP who experienced OMD when MTP was discontinued		
LeRiger *et al*.	2017	Report of a child treated with aripiprazole + MTP + clonidine who developed OMD after induction of general anesthesia with propofol and rocuronium		
Meyers *et al*.	2018	Study of DTN in pediatric patients treated with atomoxetine and MTP/amphetamines. The Truven MarketScan database was assessed. The incidence rate of DTN with atomoxetine was 54.9 and MTP/amphetamines 77.9 per 100,000 person-years		
Uzun *et al*.	2018	7/female	Cervical DTN + apparently OMD	MTP was discontinued and biperiden was started with the resolution of the symptoms
Attalla and Ekelo	2019	A study that assessed the reports in VigiBase of the World Health Organization about MTP and lockjaw. Thirty-eight reports were analyzed In one reported, a positive rechallenge was observed. The authors believed that the cause of lockjaw was OMD		

DTN: Dystonia; MTP: Methylphenidate; OMD: Oromandibular dystonia

and a half-life of almost 3 h.[6] Its main mechanism of action is the norepinephrine–dopamine reuptake inhibition, which increases the concentration of these neurotransmitters in the synaptic cleft.[2] It was observed in rat models that the majority of this increase of dopamine occurs in the prefrontal cortex, which is the pathway pathophysiologically related to ADHD.[6]

DTN is defined by maintained involuntary muscle contractions, which result in twisting, abnormal, and often repetitive movements and/or postures.[7] It is a neurological movement disorder that may cause patients to visit the emergency department.[8] Furthermore, it is noteworthy that drug-induced DTN when compared to other movement disorders more commonly affects younger females using higher doses of medication.[9]

Drug-induced dyskinesias have been widely described in association with neuroleptic use or withdrawal, which are explained by the dopaminergic exposure with some therapeutic level variability in the striatum.[10] In this way, the oromandibular DTN secondary to MTP probably occurs due to influences in the dopaminergic pathway by the norepinephrine–dopamine reuptake inhibition.[11] Besides, it was already observed DTN in cases of MTP withdrawal.[7] Therefore, the dyskinetic movements may occur due to a disbalance state of the dopamine, in which an increase or decrease could lead to abnormal movements.[12]

The DTN secondary to MTP is probably a dose-dependent side effect because the majority of the reports with its occurrence are with high doses or overdoses causing toxicity.[13,14] However, to the authors' knowledge, no report of the literature has already shown a direct relation of dose and frequency or amplitude of the abnormal movement. Moreover, it was observed in animal studies that dyskinetic movements associated with MTP happen when there is the plasmatic peak of MTP.[6,11,15] Hence, the prescription of lower MTP doses with small increases probably does not lead to the development of an abnormal movement.[16]

There are only a few case reports of MTP associated with DTN. A literature search was performed in Medline using a set of terms that included DTN and MTP [Table 1].[1,3,5,7,11,13-15,17-26]

Another interesting fact is that DTN and convulsions when present in association with MTP therapy are sings of MTP toxicity. Doses that exceed 60 mg of the immediate-release formulation or 120 mg of the extended-release formulation can be considered toxic.[2] In these cases, benzodiazepines are considered an option to alleviate the symptoms and accelerate recovery.[23] However, the majority of the case reports in the literature with oromandibular DTN did not report the use of other drugs to improve the symptoms. We believe that this happened because the clinical manifestations occurred with fewer MTP doses, so the medication was promptly discontinued without causing an abnormal adaptation of the direct or indirect pathways.[15]

In sum, our report suggests that MTP should be listed as a probable cause of oromandibular DTN. This adverse effect, while not potentially fatal, can be very embarrassing for ADHD patients and lead to low adherence to therapy. Therefore, clinicians prescribing MTP should be aware of this possible side effect and communicate it to patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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