CASE REPORT

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Methylphenidate-Induced Oculogyric Crisis in a Patient with Autism Spectrum Disorder and Attention Deficit Hyperactivity Disorder: A Case Report

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Abstract

Methylphenidate is one of the agents used in the treatment of attention deficit hyperactivity disorder. In the literature, the following side effects were reported from the use of methylphenidate: sleep and appetite problems, blood pressure and heart rate changes, headache, nervousness, crying, tics, chorea, psychosis, and rarely dystonic reaction. Acute dystonia is a well-known extrapyramidal side effect of dopamine receptor antagonists. Oculogyric crisis, a specific form of acute dystonic reaction, refers to usually upward and sometimes lateral deviation of the eyes for a certain period due to contraction of the extraocular eye muscles. Despite the increase in dopamine-related activity, psychostimulants are also reported to cause dystonic reactions rather than blocking. In this study, a patient with oculogyric crisis after the initiation of methylphenidate treatment was analyzed. Although rarely observed, dystonic reactions that may occur after methylphenidate use should be considered by clinicians.

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INTRODUCTION

Methylphenidate is one of the agents used in the first-line treatment of attention deficit hyperactivity disorder (ADHD). It has a stimulating effect on the central nervous system. It is considered to act directly by increasing the release of dopamine and norepinephrine in the prefrontal cortex and striatum and indirectly by inhibiting the reuptake of dopamine and noradrenaline by inhibition of presynaptic transporters in these regions [1]. The following side effects were reported after the use of methylphenidate: sleep and appetite problems, blood pressure and heart rate changes, and neurological side effects, such as headache, nervousness, crying, tics, chorea, dyskinesia, and psychosis [2,3].

An acute dystonic reaction refers to a neurological movement disorder characterized by an involuntary spasm due to extended motor activity during muscle contraction. It usually affects the eye (oculogyric crisis), jaw, tongue (dysarthria), and neck muscles (torticollis); however, it may also affect body muscles (opisthotonus, Pisa syndrome). It might be painful and life-threatening if it affects the respiratory muscles [4]. Oculogyric crisis, a specific form of acute dystonic reaction, refers to usually upward and sometimes lateral deviation of the eyes for a certain period due to contraction of the extraocular eye muscles. Most cases of oculogyric crisis have been reported to be drug-induced,most commonly as side effects of antipsychotic agents, antiemetics or other dopamine antagonists. The frequency of drug-induced acute dystonia has been reported to be between 2.3% and 94% in different studies [5-6].

In this study, a patient who was diagnosed with autism spectrum disorder (ASD) and ADHD and developed an oculogyric crisis after the initiation of treatment with methylphenidate was discussed.

CASE

A 6.5-year-old male patient was brought to the outpatient clinic by his parents due to complaints of hyperactivity, walking around the classroom, inability to sit still, and not paying attention to the lessons. According to the anamnesis obtained from his parents, he has been under follow-up by the child psychiatry clinic due to the diagnosis of ASD since the age of 3.5. He received special education, and he has been continuing his education through formal education. Moreover, he started 1st grade of the primary school after two years of kindergarten education. He does not comply with the classroom rules, he does not listen to the teacher during lessons, he walks around the classroom constantly, he makes strange noises, he shows stereotyped jumping and arm-flapping,

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he never communicates with his friends, he only receives commands from his teacher at school, he closes his ears when he hears loud sounds, he learned to read and write, and he has good mathematical skills, he is also hyperactive at home and jumps on the sofas constantly.

In the psychiatric examination of the patient, it was determined that the eye contact was limited, he did not respond to his name, he spent time on his own, he only received commands from his parents, he made loud sounds by closing his ears, had stereotyped movements of flapping and jumping, produced strange noises, was hyperactive, and walked around the room.

According to patient history, he lives with his parents and his 9-year-old sister. His parents attended university. Their socioeconomic status is high. He was born at term by C/S at the end of a normal pregnancy and his mother had no postpartum complications.

His walking, speaking, and toilet training were timely.

There is nothing specific in his family history.

The patient was diagnosed with ASD and ADHD according to the DSM-5 diagnostic criteria. Drug treatment with short-acting methylphenidate 2.5 mg once a day was initiated. After 3 days, the dose was increased to 5 mg/g in two divided doses. On the second day of this dose, his eyes were observed to have a deviation to the left and upwards, which started about 1 hour after taking the morning dose. He was evaluated in terms of organic etiology; blood tests, EEG, and MRI were performed. No organic etiology was identified. The patient was considered to have developed an oculogyric crisis following the initiation of methylphenidate. About 7 hours after the discontinuation of methylphenidate, the complaints regressed and did not recur.

Informed consent was obtained from the patient's family to report the case in this case study.

DISCUSSION

Acute dystonia is a well-known extrapyramidal side effect of dopamine receptor–blocking agents (DBA). The pathophysiology of dystonia has not been fully elucidated; however, various opinions about its occurrence have been suggested. Two opposite hypotheses were proposed as a mechanism of acute dystonia. According to the first hypothesis, dopaminergic hypofunction results in the relative hyperactivity of cholinergic mechanisms. This hypothesis is supported by a consistent recovery in acute dystonia using anticholinergic drugs. The second hypothesis suggests that there is a paradoxical dopaminergic hyperfunction induced by DBA through blockade of presynaptic dopamine receptors. Moreover, as the level of DBA decreases, the sensitized postsynaptic receptors are exposed to the natural release of dopamine from the presynaptic terminals. However, acute dystonic reactions can be triggered by all drugs that alter the dopamine signal. Besides, antiemetics that block central dopamine receptors (droperidol, metoclopramide, and prochlorperazine), lithium, selective serotonin reuptake inhibitors, and tricyclic antidepressants may also cause dystonia [4]. Despite the increase in dopamine-related activity, psychostimulants are also reported to cause dystonic reactions instead of blocking them. In the literature, there are case reports of acute dystonia or dyskinesia reactions developed after discontinuation of or beginning methylphenidate treatment [5-10]. In the case reports in the literature, it is stated that methylphenidate-induced acute dystonia resolves with drug discontinuation. However, there are case reports stating that the use of biperiden can be successful in the treatment of acute dystonia.

Arslan et al. reported a 9 year old boy admitted to the emergency department with orofacial and limb dyskinesia after administration of the first dose of methylphenidate. Methylphenidate was discontinued, and the patient's symptoms resolved within 20 minutes after intravenous biperiden injection [8]. Kazancı et. al reported 3 cases with orofacial and/or limb dyskinesia after methylphenidate administration. Intramuscular biperiden 2.5 mg was administered to the first case. Two hours after biperiden, involuntary orofacial and limb movements completely resolved. Methylphenidate treatment was discontinued because his parents did not want to use medication. In the other 2 patients, the symptoms resolved completely in a couple of hours after ingestion of methylphenidate without any treatment and continuation of the methylphenidate treatment did not cause recurrent dyskinesia [10].

In our case, the patient who was diagnosed with ASD and ADHD and did not receive any other drug treatment developed an oculogyric crisis after dose increase following the initiation of low-dose methylphenidate.

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