

Suicidal attempt with high dose long-acting methylphenidate: A case report

Yüksek doz metilfenidat ile intihar girişimi: Bir olgu sunumu

Duygu MURAT, Ayşe ARMAN

ABSTRACT

Stimulant medications are the most commonly used drugs for the treatment of attention-deficit hyperactivity disorder (ADHD). Reports of suicide attempts in ADHD cases with high dose long-acting methylphenidate (MPH) are limited in the literature. In this case report, a 13-year-old boy who had attempted suicide by ingesting 1350 mg long-acting MPH and 2 mg risperidon is discussed. While the patient did not have life threatening symptoms, emergency medical intervention was necessary.

Key words: Suicidal attempt, Methylphenidate, Intoxication

ÖZET

Stimülanlar, dikkat eksikliği hiperaktivite bozukluğu (DEHB) tedavisinde yaygın olarak kullanılan ilaçlardır. Literatürde, DEHB olgularında uzun etkili metilfenidat ile intihar girişimi olgu sunumları sınırlı sayıdadır. Bu olgu sunumunda 1350 mg uzun etkili metilfenidat ve 2 mg risperidon ile intihar girişiminde bulunan 13 yaşında erkek hasta tartışılmıştır. Hastada hayatı tehdit eden belirtiler olmamakla birlikte acil tıbbi müdahale gerekli olmuştur.

Anahtar kelimeler: İntihar girişimi, Metilfenidat, İntoksikasyon

Introduction

The role of stimulants in treatment of children with attention-deficit hyperactivity disorder (ADHD) was well-established by the 1970s. Since then, the database supporting the safety and efficacy of these stimulants has grown exponentially. Methylphenidate (MPH) increases dopamine and noradrenalin in synapses and extracellular spaces of dopaminergic neurons in the central nervous system (CNS) [1]. Both short and long-acting MPH medications are widely used for the treatment of ADHD. The safety and tolerability of long-acting stimulants are similar to those of short-acting stimulants, appear to have a somewhat lower risk of abuse and diversion, and may be associated with significant improvements in medication adherence [2, 3]. Short-acting medications, in contrast may allow for more flexibility with the dosing frequency, titration, and determining the drug tolerability and can be taken on an as-needed basis when coverage is needed for a few hours [4]. As the therapeutic uses of long-acting MPH preparations in children and adolescents with ADHD are increasing, so does the risk of unintentional and intentional overdoses due to abuse, misuse, and suicidal inclinations. [4-6].

The intra-nasal and parenteral abuse of short-acting stimulants among teenagers has been reported in addition to mega dose ingestion for suicidal purposes among ADHD cases [7, 8]. Suicide attempts with long-acting MPH preparations have also been described in case reports [6, 9].

In the present report, we describe a suicide attempt involving a high dose (1350 mg) of long-acting MPH in a 13-year-old boy.

Case Report

A 13-year-old boy, accompanied by his parents, was admitted to the emergency clinic approximately nine hours after ingesting 30 tablets of 27 mg long-acting MPH, 30 tablets of 18 mg long-acting MPH, and 2 tablets of 1 mg risperidone.

Psychiatric history

His mother had had no medical problem during the pregnancy; there were no complications in the course of the perinatal period. His developmental history and intellectual

Duygu Murat [✉], Ayşe Arman
Department of Child and Adolescent Psychiatry, School of Medicine, Marmara University, Istanbul, Turkey
e-mail: duygucaalisir44@yahoo.com

Submitted/Başvuru: 28.05.2013 - Accepted/Kabul: 23.06.2013

capacity were within normal limits. In his previous psychiatric history; his first visit to a child and adolescent psychiatrist was for hyperactivity when he was three years old. A solution of risperidone was prescribed between the ages of 3-7 for hyperactivity and impulsivity. He began to use MPH since age of seven. He used the MPH prescriptions irregularly until he was 10. Two years ago, he had a cardiac arrest and was reanimated after a traffic accident. During the last 2 years he started to skip school, began to smoke and was frequently lying. His academic success decreased in school. His parents consulted a readmitted child and adolescent psychiatrist with these symptoms. Besides ADHD, an additional diagnosis of a conduct disorder was also made and risperidone treatment was added to the MPH treatment. At the time of the suicide attempt, he was being treated with 27 mg of long-acting MPH daily with a moderate response. There was no history of any neurological disorder or substance abuse. There was no other concomitant medication used for other medical purposes. Projective tests given by the psychologist revealed low frustration tolerance, motives of hostile dependency, and immature defences in response to aggression.

In his family history, his mother had a panic disorder diagnosis but nobody had been diagnosed as ADHD. In follow-ups he also presented depressive moods, consistently present for more than two weeks, therefore sertraline was also added to treatment. He reported increasing depressive symptoms over recent weeks and suicidal ideation over a few days in direct connection with conflicts in the family environment due to his school difficulties. There were no clues on a relation between the depressive symptoms and the stimulant medication. On the day on which he attempted suicide, he had skipped school. When he came home his mother threatened him by saying that she would tell his father. He was frightened of his father, who would be angry with him and then attempted suicide. Before attempting suicide, he made a will. Then he took the pills in his room when he was alone. Thirty minutes later he started vomiting. He had palpitations and felt as if he was going to die. Then he decided to call his mother for help.

Physical findings

During the physical evaluation in the emergency service, his vital signs were normal. His height and body weight were 176 cm and 54 kg., the heart rate was 98/min, the blood pressure was 110/70, O₂ saturation was 98%. His respiration was spontaneous. Body temperature and laboratory findings were normal. He was immediately taken to the reanimation department and was monitored. His stomach was irrigated through a nasogastric tube and then activated charcoal was administered. Antioxidant therapy (acetylcystein) was also given. Serum MPH concentrations were not measured due to lack of laboratory measures.

Psychopathological findings

When the boy presented to the hospital, his general appearance was moderately affected. He was somnolent and barely cooperative.

During the first hour of the suicide attempt, his behavior changed abruptly and he mentioned that he was unable to control his movements. He showed moderate agitation and restlessness. He acted as though he was being vigilant. There was increased salivation. He also complained about intense palpitations which were accompanied by a feeling of sudden death. His mother described that he was nervous, logorrheic, and hyperkinetic at that time.

Clinical course

He was observed for two days in the intensive care unit. After all vital parameters were normal, he was discharged from the hospital. The psychiatric follow-up was continued. MPH was prescribed again for the impulsivity and risperidone medication is also added.

Discussion

We have presented a 13-year-old boy, who after severe overdose of long-acting MPH, experienced the classical symptoms of a sympathomimetic syndrome with cardiovascular symptoms and acute neurological toxicity. MPH, a piperidine-derived CNS stimulant, is widely used for the management of ADHD [10]. Side effects of MPH include nervousness, headache, insomnia, anorexia, and tachycardia which increase linearly with dose. Clinical manifestations of a drug overdose include agitation, hallucination, psychosis, lethargy, seizures, tachycardia, dysrhythmias, hypertension, and hyperthermia [11]. In all stimulant groups, clinical findings consist mainly of the symptoms and signs of sympathetic nervous system stimulation, such as palpitation, sinus tachycardia, hypertension and mydriasis [2,3]. Other frequently observed clinical findings include agitation, disorientation and anxiety [12]. In cases of severe intoxication, there may also be hyperthermia and rhabdomyolysis.

Data from the US Poison Centre have shown that in children single exposures up to 80 mg MPH are well-tolerated [13]. Only few data about intoxications with higher doses exist, and the toxic ranges of blood concentrations of extended release MPH formulations in children and adolescents have not been evaluated [2,3]. Patients who ingest more than 4 mg/kg or 120 mg of an intact modified-release formulation of MPH should be referred to an emergency department for oral exposures. Emesis induction is strictly contraindicated and administration of charcoal activated before reaching the hospital, if available, should only be carried out by health professionals after controlling other contraindications [5, 11]. Benzodiazepines

can be administered if agitation, dystonia, or convulsions are present. Standard advanced cardiac life support (ACLS) measures should be administered if respiratory arrest, cardiac dysrhythmias, or cardiac arrest is present [5].

A case report has described acute myocardial infarction in an adolescent one week after restarting a daily 20 mg prescription of mixed amphetamine salts [14]. Cardiac arrest occurred in another adolescent who was taking MPH for ADHD and who had previously had a normal baseline echocardiogram [15]. There have also been case reports of acute myocardial infarction in young patients who took therapeutic doses of MPH with concomitant use of other medications (bupropion, erythromycin and pseudoephedrine) [16]. Two case reports have described serious cardiomyopathies in young adult patients treated with MPH [17]. One account of a 28 year-old girl who had ingested 90 mg MPH with suicidal intent was published in 2010, describing an acute coronary syndrome secondary to the MPH overdose [8]. MPH increases adrenergic action in the CNS as well as in the circulatory system and is believed to be cardio toxic over time possibly producing a dilated cardiomyopathy as the end result [18].

Two suicide attempts with long-acting MPH, a 14-year girl (1134 mg) (6) and 17-year-old girl (270 mg) (9) have been reported. Our patient ingested 1350 mg of MPH along with 2 mg risperidone. This is the highest dose of long-acting MPH ingested with suicidal intent our patient had no signs of cardiac toxicity, hallucinations, agitation, hyperthermia or rhabdomyolysis. A possible explanation for the good clinical outcome in our patient may be the spontaneous vomiting after 30 minutes of the high-dose MPH ingestion; this may have been protective for this patient. Hyperemesis and vomiting are reported in one tenth of MPH overdose cases in a study of Hill's et al. [19]. In our patient the vomiting may explain the reduced side effects of MPH, no matter whether the vomiting was due to a gastric irritation, or to higher levels of CNS dopamine. The cause of vomiting needs to be investigated in depth in future studies.

As a conclusion, exposure to a large overdose of long-acting MPH exhibited minor symptoms of acute sympathomimetic toxicity but no life-threatening symptoms in this patient. Thus, this case report suggests that patients intoxicated with high dose long-acting MPH formulations might recover without sequelae in emergency settings. While long-acting stimulants offer lower risk of abuse, their greater availability increases the likelihood of ingestion for suicidal ends. Education of clinicians and families to be aware of this risk should reduce the frequency of this unwanted result of drug treatment.

References

1. Martin AM, Scahill L, Kratochvil C, (editors). *Pediatric Psychopharmacology: Principle and Practice*. 2nd ed. New York: Oxford University Press, 2011.
2. Cooper WO, Habel LA, Sox CM, et al. ADHD drugs and serious cardiovascular events in children and young adults. *N Engl J Med* 2011; 365: 1896-904. doi: 10.1056/NEJMoa1110212.
3. Habel LA, Cooper WO, Sox CM, et al. ADHD medications and risk of serious cardiovascular events in young and middle-aged adults. *JAMA* 2011; 306: 2673-83. doi: 10.1001/jama.2011.1830
4. Cascade E, Kalali AH, Weisler RH. Short-acting versus long-acting medications for the treatment of ADHD. *Psychiatry (Edgmont)* 2008; 5: 24-7.
5. Scharman EJ, Erdman AR, Cobaugh DJ. Methylphenidate poisoning: An evidence-based consensus guideline for out-of-hospital management. *Clin Toxicol (Phila)*. 2007;45 :737-52. doi: 10.1080/15563650701665175
6. Klampfl K, Quattländer A, Burger R, et al. Case report: intoxication with high dose of long-acting methylphenidate (Concerta®) in a suicidal 14-year-old girl. *Atten Defic Hyperact Disord* 2010; 2:221-4. doi: 10.1007/s12402-010-0032-0.
7. Fettahoglu EC, Satilmis A, Gokcen C, et al. Oral mega dose methylphenidate ingestion for suicide attempt. *Pediatr Int (Japan Pediatric Society)* 2009;51:844-5. doi: 10.1111/j.1442-200X.2009.02929.x.
8. Wong OF, Tsui KL, Fung HT. Acute coronary syndrome secondary to methylphenidate overdose. *Hong Kong J Emerg Med* 2010; 16:66-70.
9. Özdemir E, Karaman M, Yurteri N, et al. A case of suicide attempt with long acting methylphenidate (Concerta). *Atten Defic Hyperact Disord* 2010; 2: 103-5. doi: 10.1007/s12402-010-0026-y.
10. Challman TD, Lipsky JJ. Methylphenidate: Its pharmacology and uses. *Mayo Clin Proc* 2000; 75:711-21. doi:10.4065/75.7.711.
11. Klein-Swartz W. Abuse and toxicity of methylphenidate. *Curr Opin Pediatr* 2002; 14:219-23. doi: 10.1097/00008480-200204000-00013
12. Bruggisser M, Ceschi A, Bodmer M, Wilks MF, Kupferschmidt H, Liechti ME. Retrospective analysis of stimulant abuse cases reported to the Swiss Toxicological Information Centre during 1997-2009. *Swiss Med Wkly* 2010; 140: w13115. doi: 10.4414/smw.2010.13115.
13. Foley R, Mrvos R, Krenzelo EP. A profile of methylphenidate exposures. *Clin Tox* 2000; 38: 625-30.
14. Gandhi PJ, Ezeala GU, Luyen TT, et al. Myocardial infarction in an adolescent taking Adderall. *Am J Health Syst Pharm* 2005;62: 1494-7. doi:10.2146/ajhp040220
15. Daly MW, Custer G, McLeay PD. Cardiac arrest with pulseless electrical activity associated with methylphenidate in an adolescent with normal baseline echocardiogram pharmacotherapy. *Pharmacotherapy* 2008; 28:1408-12. doi: 10.1592/phco.28.11.1408
16. George AK, Kunwar AR, Awasthi A. Acute myocardial infarction in a young male on methylphenidate, bupropion, and erythromycin. *J Child Adolesc Psychopharmacol* 2005;15:693-5. doi:10.1089/cap.2005.15.693
17. Figueroa VM. Chemical cardiomyopathies: the negative effects of medications and nonprescribed drugs on the heart. *Am J Med* 2011;124:480-8. doi: 10.1016/j.amjmed.2010.11.031
18. Singh K, Xiao L, Remondino A, et al. Adrenergic regulation of cardiac myocyte apoptosis. *J Cell Physiol* 2001; 189:257-65. doi:10.1002/jcp.10024
19. Hill SL, El-Khayat RH, Sandilands EA, et al. In our patient the vomiting may explain the reduced side effects of MPH, no matter whether the vomiting was due to a gastric irritation, or to higher levels of CNS dopamine. In such cases, the cause of vomiting needs to be investigated in depth in future studies.