

Methylphenidate-induced Psychosis in an Adolescent with Hyperkinetic Disorder

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ABSTRACT. We have observed acute psychosis associated with methylphenidate in an adolescent with hyperkinetic disorder. The case is a 16-year-old female with symptoms including hyperkinesia, impulsiveness, and inattention. She received methylphenidate (10 mg/day) for her hyperkinesia and impulsiveness. Three weeks later, she entered a depressive state and the administration of methylphenidate was stopped. Six weeks later, she developed a schizophrenia-like episode with delusions of reference, delusional moods, blocking of thought, silly smiles, and excitement. Her condition was diagnosed as methylphenidate-induced psychosis and she was treated with perphenazine (12 mg/day). We discuss this case as an example of methylphenidate-induced psychosis.

Key words: methylphenidate — adverse effects — hyperkinetic disorder — attention-deficit hyperactivity disorder — schizophrenia-like episode

There have been many studies^{1,2)} on the effects of methylphenidate on children with attention-deficit hyperactivity disorder (ADHD)^{3,4)} or hyperkinetic disorder.⁵⁾ Most authors illustrated the efficacy of methylphenidate on the various symptoms associated with ADHD or hyperkinetic disorder, such as hyperactivity, attention deficit and impulsiveness. However, there have been reports on adverse effects of methylphenidate. According to the review of Barkley,¹⁾ the most frequent side effects are insomnia or sleep disturbance and decreased appetite, and less frequent ones are weight loss, irritability and abdominal pain. In extreme cases, some authors reported psychosis induced by methylphenidate⁶⁻⁸⁾ and, however, such reports are very few and clinical features of methylphenidate-induced psychosis have not been clear.

The authors observed acute psychosis associated with methylphenidate in an adolescent with hyperkinetic disorder. The case report is presented and methylphenidate-induced psychosis is discussed.

CASE REPORT

The case is J, a 16-year-old girl when the senior author began to treat her. The patient's parents and step-sister are in household. There was no history of psychiatric disorder in the biological family. Her birth weight was 2,800 g and she had no problem in her pre-, peri- and postnatal period. Early mental and

physical development was almost normal.

When she entered primary school, her behavior problems were pointed out for the first time by her teacher in charge. She was hyperactive and impulsive, and could not sit quietly in classes. She could not concentrate on studying and her school record was poor. However, she had managed to adapt to school life.

When she was 12 years old, she entered middle school. Her symptoms did not diminish and she developed problems of interpersonal relationships. She was bad-tempered and selfish and, therefore, often had quarrels with classmates. She then began to refuse to go to school, complaining headache. At home, she had troubles with the family members and they could not cope with her problems. One night, she became excited, broke furniture, rushed out of home and eventually was held by police. The parents took her to some mental hospitals.

According to the case note of one of the mental hospitals which she visited, she was very irritable, restless and rude. When she was not comfortable, she became quick-tempered and violent. A psychiatrist regarded her hyperactivity as manic and prescribed haloperidol (2.25 mg/day) at first, then changed it to chlorpromazine (30 mg/day). His efforts to treat her with major tranquilizers resulted in failure. At last, she was hospitalized. During this hospitalization, although the parents took steps to enter her in a high school, she was not able to go to school.

According to the case note of the mental hospital, she exhibited an excited state, being violent physically and verbally. The psychiatrist in charge diagnosed her condition as conduct disorder, pointing out her extreme aggression. Her behavior in the hospital were characterized as hyperactive, restless and impulsive. She was very quick-tempered and tended to become excited and always aggressive to the staff. Eventually, she consistently became a problematic patient in the hospital. As pharmacotherapy, minor tranquilizer (such as benzodiazepine derivatives), haloperidol, perphenazine and imipramine were prescribed for her symptoms, but they had no good effects on her. Although the nurse team tried to conduct behavior therapy, she did not accept it.

After discharge, she was treated as an out-patient and the senior author began to treat her as the charged psychiatrist. As an example, a situation at the clinic when she visited is illustrated. When she was in the waiting room, she was running around and talked loudly to anybody she saw, which made the clinic very noisy. She was called "a typhoon girl" by the nurses, which well expressed her behavior. In the interview room, she was not able to be quiet and was always moving her limbs and body. If she heard the voice of a familiar nurse outside of the room, she rushed out and the interview was interrupted. However, her hyperactivity, restlessness and inattentiveness were not so clear, when she was talking about her loneliness and regret.

At this time, she had no abnormality on electroencephalogram examination or neurological tests. IQ was not able to be calculated because she was not able to concentrate on the test and gave up it. The psychologist who conducted the test and the psychiatrist have the impression that her IQ was around 70.

The authors held a clinical conference and concluded that she has suffered

from ADHD since she was 6 years old, according to DSM-III-R³⁾ and from secondary neurotic symptoms due to maladaptation to the school, poor relationship with peers and conflicting relationship with parents. Later on, her condition was diagnosed as hyperkinetic disorder according to ICD-10.⁵⁾ The treatment strategy was that she should be treated with methylphenidate and that supportive psychotherapy was needed for her psychological problem.

She was prescribed methylphenidate (10 mg/day) in the morning and her behavioral response was very positive. In the two days after the prescription, her hyperactivity and impulsiveness diminished, her temper disappeared and she became easy to treat.

Three weeks later, the mother reported by telephone that she seemed depressed, always being alone. The psychiatrist considered that it might be the depressed state which had been reported as one of the adverse effects of methylphenidate.⁹⁾ Dose of methylphenidate was reduced to 5 mg/day.

The patient visited the clinic 1 month after the prescription of methylphenidate. She did not exhibit hyperactivity or impulsiveness and sat calmly. Her facial expression was depressed and she reported a depressed or blue mood. The therapist diagnosed her condition as a depressive state and discontinued methylphenidate.

Six weeks later, the mother reported that she was always empty, did not answer correctly to her question and sometimes smiled meaninglessly. Although she had preferred cleanliness and had been in the forefront of fashion in dress, she wore a dirty sweat shirt and often refused to take a bath. In the interview, she listened to the doctor absent-mindedly or vacantly and sometimes failed to answer. She complained that she felt the neighborhood gossiping about her and the television saying something about her, and that her familiar surroundings had changed mysteriously into something dreadful, odd and strange. And she also said, "I forget what I am thinking, I don't know why I do things. But I forget suddenly ...". A depressed mood was not clear in this interview. According to the mother's information, a few days ago, she was terrified and shouted that the mother was killing her, and she was in a state of excitement, in which a terrifying feeling was predominant, and which was distinguished from the previous excitement with extreme aggression. The psychiatrist considered delusions of reference and persecution, delusional mood, silly smile and thought block like symptom and diagnosed her condition as a schizophrenic-like psychotic state and prescribed perphenazine (12 mg/day).

She took the antipsychotic drug for 2 months and her psychotic symptoms disappeared. Then she reverted to the previous state and showed similar hyperkinetic or ADHD symptoms.

DISCUSSION

Methylphenidate is one of the stimulant drugs and is a piperidine derivative that is structurally related to amphetamine.¹⁰⁾ In contrast to amphetamine, methylphenidate is a milder CNS stimulant with more prominent effects on mental than on motor activity.¹⁰⁾ Stimulants including methylphenidate and amphetamine are considered to have normalizing effects on ADHD or hyperkinetic children,^{1,2)} improving symptoms, such as hyperactivity, attention deficit and impulsiveness. In Japan, amphetamine use

is strictly limited in medical treatment and research. In essence, only methylphenidate is used as a stimulant drug in the treatment of ADHD or hyperkinetic children.

In spite of many reports which successfully replicated the favorable effects of methylphenidate, there have been reports on the adverse effects. Barkley¹⁾ described the stimulant drugs whose most frequent side effects were insomnia or sleep disturbances and decreased appetite, and whose secondary side effects were weight loss, irritability and abdominal pain. Methylphenidate-induced isolation in peer relationships was also suggested.¹¹⁾ Although methylphenidate-induced psychosis is not considered being the major side effect, some authors demonstrated psychosis or hallucinosis associated with methylphenidate in ADHD children.⁶⁻⁸⁾

Lucas and Weiss⁷⁾ reported 3 cases in which the authors observed methylphenidate hallucinosis, and Young⁸⁾ demonstrated 2 cases with methylphenidate-induced hallucinosis. In 1988, Bloom and his colleagues⁶⁾ reported a case with methylphenidate-induced delusional disorder. Table 1 shows the characteristics of each case, including ours. In our case, there was not evident hallucination. The first case reported by Lucas and Weiss⁷⁾ and the case of Bloom and his colleagues⁶⁾ are similar to ours. We suggest that there are 2 types of methylphenidate psychosis; the first being hallucination dominant type and the second, delusion dominant type.

TABLE 1. Comparison of the reported psychosis associated with methylphenidate in hyperkinetic patients

	Age (years)	Sex	Dose (mg/day)	Duration+	Main symptoms
1.*	6.5	female	15	7 days	excitement & catatonic withdrawal
2.*	10	male	10	5 days	visual hallucination
3.*	15	female	60	1 day	visual hallucination
4.**	10	male	20-30	several years	visual & auditory hallucination
5.**	8	male	20	3 days	visual hallucination
6.***	6	male	20	6 months	delusions
7.****	16	female	10	1.5 months	delusions and excitement

+ From first prescription of methylphenidate to appearance of psychotic symptoms

*Lucas & Weiss (1970), **Young (1981), ***Bloom *et al* (1988), ****This report

Bellak¹²⁾ insisted that there was a separate entity of ADD (attention deficit disorder) psychosis and that about 10% of psychosis currently diagnosed most often schizophrenic and sometimes affective psychosis must best be considered a separate organic psychosis; that is ADD psychosis. Mino and his colleagues¹³⁾ reported psychosis in an ADD patient who had not taken stimulant drugs and his symptoms and course were very similar to the ADD psychosis described by Bellak. However, a part of ADD psychosis might be associated with methylphenidate if the patients have a history of treatment with methylphenidate. We need more epidemiological studies and careful consideration on the association between ADD psychosis and methylphenidate-induced psychosis.

Therapists might sometimes fail to observe psychotic symptoms, since most

ADHD or hyperkinetic children who are prescribed methylphenidate are children and their verbalizing ability has not developed enough to express psychotic symptoms. Therefore, there might be more cases of psychosis associated with methylphenidate than usually estimated. Psychotic symptoms should be given careful attention after the prescription of methylphenidate.

REFERENCES

- 1) Barkley RA : A review of stimulant drug research with hyperactive children. *Child Psychol Psychiatry* **18** : 137-165, 1977
- 2) Taylor EA : The basis of drug treatment. *In* *Overactive Child*, ed by Taylor EA. Oxford, Blackwell Scientific Publication. 1986, pp 192-228
- 3) American Psychiatric Association : Diagnostic and Statistical Manual of Mental Disorders, 3rd ed, DSM-III-R. Washington DC, American Psychiatric Association. 1987
- 4) American Psychiatric Association : Diagnostic and Statistical Manual of Mental Disorders, 4th ed, DSM-IV. Washington DC, American Psychiatric Association. 1994
- 5) World Health Organization : The ICD-10 Classification of Mental and Behavioural Disorders. Geneva, WHO. 1992
- 6) Bloom AS, Russell LJ, Weisskopf B, Blackerby JL : Methylphenidate-induced delusional disorder in a child with attention deficit disorder with hyperactivity. *Am Acad Child Adolesc Psychiatry* **27** : 88-89, 1988
- 7) Lucas A, Weiss M : Methylphenidate hallucinosis. *JAMA* **217** : 1079-1081, 1971
- 8) Young J : Methylphenidate-induced hallucinosis : case history and possible mechanism of action. *J Dev Behav Pediatr* **2** : 35-38, 1981
- 9) Cantwell D : Hyperkinetic syndrome. *In* *Child Psychiatry*, ed by Rutter M, Hersov L. Oxford, Blackwell Scientific Publication. 1977
- 10) Franz DN : Central nervous system stimulants. *In* *The Pharmacological Basis of Therapeutics*, 6th ed, ed by Goodman LS, Gilman Aiton. New York, Macmillan Publishing. 1980, pp 585-591
- 11) Mino Y, Ohara H : Methylphenidate and interpersonal relationships of children with attention deficit hyperactivity disorder. *Jpn J Psychiatry Neurol* **45** : 45-51, 1991
- 12) Bellak L : ADD psychosis as a separate entity. *Schizophr Bull* **11** : 523-527, 1985
- 13) Mino Y, Nagamatsu K, Yoshida T : Report of an adolescent suffering from a delusional state who was diagnosed as attention deficit disorder in childhood. *Jpn J Child Adolesc Psychiatry* **28** : 226-233, 1987 (in Japanese with English abstract)