A 31-Year-Old Man with Resting Tremors and a History of Chronic Toluene Use

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A 31-year-old man had enrolled himself after hospital discharge in a Mentally Ill and Chemically Addicted (MICA) partial program because he needed structure and group therapy for the treatment of his addictions and the maintenance of his mental health. The patient reported he needed help for his anxiety, insomnia, and labile mood. The patient wanted to be healthy, free of his addiction, and a productive member of society. He was in follow-up services at the MICA partial hospital program right after being discharged from the hospital. The patient had dropped out of follow-up care after his first enrollment in the MICA program and continued to drink alcohol, so he was admitted again. He was also abusing opioids and was on partial agonist therapy for the 6 months prior to hospital admission and remained in remission for opioids. He presented to us for help with anxiety, insomnia, mood lability, substance abuse, and parkinsonism symptoms/peripheral tremors.

The patient started using marijuana a few times per week at age 16 years, but his last use was at age 30 years. He used methamphetamine from age 21 to 22 years. The patient also recreationally used oxycodone from age 17 to 24 years. He also started using volatile inhalants, such as compressed air that is used to dust computer keyboards, when he was a teenager and began using it several times per week for about 3 years in his late twenties, but his last use was more than 1 year prior to his presentation. The patient had also experimented with cocaine and crack, but he reported his last use was approximately 8 years prior to this current presentation. He had a history of multiple detoxifications and rehabilitation attempts.

The patient had two previous psychiatric hospitalizations and had just been discharged from the second one. He had previously been diagnosed with mood disorder not otherwise specified, anxiolytic dependence with physiological dependence, alcohol dependence with physiological dependence, and inhalant dependence with physiological dependence. He also had a history of taking lamotrigine and quetiapine, as well as suicidal ideations without any reported attempts. He had no history of homicidal ideations.
or attempts. He alleged one incident of sexual abuse by an older man when he was age 10 years. The patient reported emotional abuse by his mother who allegedly threatened to abandon him between the ages of 7 and 12 years. He reported a history of verbal and physical aggression toward an ex-boyfriend when intoxicated. The patient also had a history of legal charges for misdemeanors, petty theft, cannabis possession, and violation of probation, as well as property destruction when enraged and intoxicated. The patient indicated that he had no access to firearms.

The patient’s medical history included a diagnosis of supraventricular tachycardia with ablation of the slow pathway. The patient also said he started having resting and postural tremors on his left hand in his late twenties. The patient also began having tremors on the right side, including clonic jerks. He also experienced coordination and balance problems.

His family history included (questionable) mental illness, including depression and anxiety, in his mother and sisters. One of his sisters had a history of cocaine use, his mother a history of stimulant use, his maternal grandfather a history of alcohol use, and his maternal grandmother a history of benzodiazepine use. He did not know of any family history of suicide.

The patient was wearing casual clothes, was cooperative, and made good eye contact. The patient was awake, alert, and oriented to time, person, and place. He had peripheral tremors and postural instability. His speech was soft, fluent, coherent, and spontaneous with normal rate and rhythm. His thought processes were coherent, his thought associations were intact, and he denied suicidal or homicidal ideations. The patient had no auditory or visual hallucinations elicited, and no delusions elicited. His judgment was fair, his insight was moderate, his memory was grossly intact, and his attention span was intact. The patient’s knowledge/awareness of events was intact, his mood was fine, and his affect was appropriate, full, and euthymic.

**DIAGNOSIS**

**Toluene-Induced Parkinsonism**

The patient was diagnosed with parkinsonism 6 months previously by a neurologist. He was recommended to see a movement disorder specialist and had an appointment scheduled to do so. The patient was also prescribed carbidopa-levodopa but he stopped taking it due to adverse effects. He also tried primidone with improvement in his tremors but a complete remission of symptoms was not achieved. Primidone was later discontinued due to intolerance.

Besides his chief complaints, the patient presented to us because he also wanted to know if the peripheral tremors were due to his drug use and substance abuse.

The clinical features of toluene-induced tremors are as follows: (1) the tremors are found mainly in the upper extremities, (2) they have a frequency of 4 to 5 Hz, (3) postural or intentional tremors are present but there are no resting tremors, and (4) the tremors are generally intractable to medical treatment.1

In this case, the patient presented with tremors that were profound in the upper extremities, more postural tremors were present, and the tremors showed no improvement on treatment.

The patient in this case had enough of the clinical features of toluene-induced tremors to be diagnosed with toluene-induced parkinsonism. The range of symptoms of parkinsonism induced by toluene use can vary depending upon the duration and amount of exposure to it.2

**DISCUSSION**

Parkinsonism is a condition with symptoms similar to that of Parkinson’s disease (PD) but with different underlying pathologies. The symptoms of parkinsonism are tremors, rigidity, bradykinesia, and postural instability, whereas PD is a neurodegenerative disease and one of the most common causes of
Parkinsonism is a condition that has movement problems similar to PD. About 80% of parkinsonism patients have PD as the underlying cause, and PD has an incidence of 20 per 100,000 people. Besides neurodegenerative diseases, there are many other causes of parkinsonism, especially substance abuse and medications such as beta agonists, lithium, antiemetics, and some anticonvulsants. Chronic use or acute withdrawal of some substances can also lead to the development of tremors, myoclonus, and other movement disorders. Chronic exposure to certain substances in low quantities can also cause degeneration of the brain tissue and lead to parkinsonism. Toluene is one such substance that is known to cause toxic injuries to the dopaminergic system in the brain. There is sufficient evidence to prove that toluene itself can cause biochemical and morphological changes in the nigro-striatal dopamine system. Exposure to toluene for more than 6 months increases dopaminergic tissue dysfunctions. Tremors are one of the most common manifestations of chronic use of toluene. PD is due to a loss of dopamine-containing neurons, and toluene can cause the loss of dopamine-containing neurons, resulting in parkinsonism. The patient in this case had a history of chronic use of toluene and presented with symptoms of parkinsonism.

The patient had used many illegal substances without any preference for one over the other. At the time of his presentation he was using alcohol, marijuana, methamphetamine, oxycodone, and volatile inhalants that contained toluene.

The patient had experienced many episodes of withdrawal symptoms from alcohol use during the course of rehabilitation. These symptoms were mostly in the form of diaphoresis, tremors, palpitations, irritability, anxiety, and restlessness, and they were managed accordingly.

The patient was in his late twenties when he first noticed profound resting tremors in his left hand, which then also appeared in his right hand and later became clonic jerks. At the time this occurred, the patient was mainly using inhalants (two or more cans 2 to 3 times weekly) and alcohol in a moderate amount. He was also taking methadone and gabapentin, which had been prescribed. The parkinsonism symptoms progressed and the patient presented with coordination and balance problems. Even though the patient had a history of polysubstance abuse, which has the potential to cause parkinsonism symptoms, the use of toluene could be the main cause for such a presentation. Toluene is known to not only cause damage to dopaminergic neurons, but also to other areas of the brain, peripheral nervous system, and the optic nerve depending on the length of exposure. This patient did have a history of toluene use for more than a period of 2 years. He used it several times per week and had also used it during his teenage years. As mentioned previously, exposure to toluene over an extended period of time has been shown to cause damage to the dopaminergic neurons and create lesions in the dentatorubro-olivary system, thus depleting dopamine and causing parkinsonism.

**CONCLUSION**

Taking into consideration that the patient is a known polysubstance abuser, there could be other drugs and substances adding to the symptoms of the patient. Alcohol, opiates, and cannabis all are known to present with similar symptoms when used in chronic or acute form, but studies and research in the past have proven that toluene induces parkinsonism, and the symptoms produced are hard to control with medication. Unfortunately, the damage to the brain tissue by toluene is permanent and the symptoms are irreversible.

**REFERENCES**

3. International Parkinson and Movement


