Case Report

Postural tremor induced by paint sniffing

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Introduction

Volatile substance abuse (VSA) is the deliberate and intentional inhalation of volatile solvents, aerosols, gases or nitrates for the purpose of intoxication. This practice is more common among young people, due, in part, to the low cost and ready availability of these inhalants. In this report, we present the case of a 22-year-old male with a seven-year history of chronic paint sniffing. The patient presented with vigorous postural and kinetic tremor in both hands. A neurological examination revealed a bilateral, non-fatiguing geotropic positional nystagmus and a mild ataxia together with dysdiadochokinesis. He also had a mild chronic encephalopathy. Following treatment with clonazepam, the tremors subsided, but were not completely controlled.

Key words: Chroming, inhalant abuse, paint sniffing, postural tremor, sniffing, toluene

The management of solvent misuse is a challenge for healthcare professionals. It is often difficult for the treating physician to obtain an accurate history of solvent use. Patients are reluctant to report their drug use and the lack of specific syndromes or clinical presentations associated with inhalant use makes diagnosis difficult.[1] The following report is the case of a medically intractable postural tremor induced by recreational paint sniffing. Whilst not uncommon among inhalant users, there is a lack of reporting of this and related pathologies.

Case Report

A 22-year-old right-handed man presented with a simple, right-sided ankle fracture. He had a history of chronic paint sniffing spanning a period of approximately seven years, from the age of 16 to 22. Treatment of the ankle fracture involved open reduction and internal fixation. The patient reported daily inhalation of paint solutions, most likely those containing toluene. Clinical investigation revealed no prior history of mental retardation, head trauma, demyelinating disease or a family history of neurologic disease. The patient first developed a postural tremor in his right hand at 20 years of age. The tremor gradually increased and progressed to his left hand.

At admission, the patient’s right hand displayed a prominent postural tremor with a frequency of 5-6 Hz, which increased when the patient initiated voluntary movements. A tremor was also noted in his left hand, but with less intensity. There was no evidence of tremor in either hand at rest. Consequently, the tremor was deemed to comprise postural and kinetic components with larger amplitude during the terminal portion of a target-directed movement [Table 1]. A neurological examination revealed a bilateral, non-fatiguing geotropic positional nystagmus to the left side and a mild gait ataxia together with dysdiadochokinesis. During his hospital stay, the patient developed a cerebellar syndrome, evident with the symptoms ataxia, nystagmus...
and tremor. Consistent with chronic paint sniffing, mild chronic encephalopathy was diagnosed, characterized by a mild cognitive dysfunction: verbal IQ = 79 and performance IQ = 84.

### Discussion

The intentional use of volatile substances for intoxication significantly increases the risk of morbidity and mortality in the adolescent population worldwide. However, the risk is poorly documented. The abuse of inhalants is a significant problem among specific groups of youth in our community. Common household glues, paints and aerosol propellants are among the most commonly used products for inhalation, of which toluene is the most damaging to the CNS.

It was believed that the patient inhaled the fumes of spray paints and paint thinners. However, the patient refused to disclose the specific types of inhalant he had used. Paint, paints thinners and other volatile substances used as inhalants, typically contain the toxic chemicals toluene, butane, propane or fluorocarbons. Toluene, also known as methylbenzene or phenylmethane, is a clear, water-insoluble liquid that has the odor typical of paint thinners and sweet smell of the related compound benzene. Adolescents are indifferent to the health threats posed by inhalation of solvents. Of particular concern is the risk of toluene-induced encephalopathy, characterized by euphoria, hallucinations, nystagmus, seizures and coma. Further complications include serious organ system dysfunction or even sudden death, mainly due to respiratory failure.

Central nervous system exposure to the toxic constitutes of inhalants is associated with neurophysiological and neuropsychological impairment. Most noticeably, these manifest in cerebellar and cognitive dysfunction, pyramidal signs, cranial nerve damage, progressive sensorimotor neuropathy, gastrointestinal and endocrinologic disorders and involuntary movements.

The possible long-term outcomes for chronic toluene use include presenile dementia, cognitive dysfunction and dementia. Several studies suggest a correlation among demonstrable cerebral white matter damage, level of impairment and the length and intensity of the constituent toluene exposure. In cases where the adverse neuropsychological and physiological effects of inhalant use are clearly evident, it is important to exclude other causes of tremor and cognitive impairment in a young person (e.g., Wilson’s disease) to avoid misclassification.

Acute effects of solvent abuse include sudden sniffing death syndrome (SDS), asphyxia and serious injuries (e.g., falls, burns, frostbite). In cases of continued, chronic abuse, neurological damage can be permanent. Withdrawal symptoms due to abrupt cessation of inhalant use are usually mild and can include anxiety, depression, loss of appetite, irritation, aggressive behavior, dizziness, tremors and nausea. However, in some cases severe symptoms can occur, including seizures, coma, cardiopulmonary arrest or death. Diagnosis of inhalant abuse can be difficult. It is almost exclusively based on a careful medical history and a high index of suspicion. Currently, no specific laboratory tests are available to confirm solvent inhalation. Thus, the management and treatment of inhalant misuse is simply observing and supporting the patient through sobriety and withdrawal because there are no counteragents for inhalant intoxication.

Inhalant abusers are often not be brought to the attention of medical personnel, unless intoxication is life-threatening or has induced serious damage. An understanding of a patient’s immediate solvent history, as well as prior abuse, is important in the management of acute intoxication. Unfortunately, solvent history is often difficult to obtain, especially if the patient is uncooperative, confused or unconscious. Family members, friends and staff members may be alternative sources for obtaining information regarding inhalant

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**Table 1: Classification and characteristics of tremor**

<table>
<thead>
<tr>
<th>Type of tremor</th>
<th>Frequency</th>
<th>Amplitude</th>
<th>Occurrence</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rest tremor</td>
<td>Low to medium (3 to 6 Hz)</td>
<td>High; decreases with target-directed movement</td>
<td>Limb supported against gravity; muscles are not activated</td>
<td>Parkinson’s disease; drug-induced parkinsonism (neuroleptics; metoclopramide)</td>
</tr>
<tr>
<td>Action tremor</td>
<td>--</td>
<td>--</td>
<td>Any voluntary muscle contraction</td>
<td>Physiologic tremor; essential tremor; metabolic disturbance; drug or alcohol withdrawal</td>
</tr>
<tr>
<td>Postural tremor</td>
<td>Medium to high (4 to 12 Hz)</td>
<td>Low; increases with voluntary movement</td>
<td>Limb maintains position against gravity</td>
<td></td>
</tr>
<tr>
<td>Kinetic tremor</td>
<td>Variable (3 to 10 Hz)</td>
<td>Does not change with target-directed movement</td>
<td>Simple movements of the limb</td>
<td></td>
</tr>
<tr>
<td>Simple kinetic</td>
<td></td>
<td></td>
<td></td>
<td>Cerebellar lesion (stroke, multiple sclerosis, tumor); drug-induced (lithium; alcohol)</td>
</tr>
<tr>
<td>Intention</td>
<td>Low (&lt; 5 Hz)</td>
<td>Increases with target-directed movement</td>
<td>Target-directed movement</td>
<td></td>
</tr>
</tbody>
</table>

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Chronic neurological sequelae (e.g. cerebral and cerebellar dysfunction) resulting from long-term abuse are often permanent and difficult to manage. The treatment of inhalant abuse and dependence involves counseling, strict abstinence and enrollment in drug rehabilitation programs.

In the case of our patient, he was initially treated with β blockers, but these showed no therapeutic benefit in regard to the patient’s tremor. Consequently, the patient was treated with clonazepam, which reduced the tremors, but not completely. It would appear that the involuntary movement due to toluene misuse is not a transient symptom, but rather an irreversible and slowly progressive symptom, which persists even after cessation of solvent misuse. This may also explain the overt tremors evident in the case of our 22-year-old patient with a seven-year history of solvent misuse, including paint sniffing.

Individuals who misuse solvents by inhaling them for the purpose of intoxication tend to come from disadvantaged social circumstances, particularly dysfunctional families. From clinical experience, a good outcome in such patients is difficult to achieve due to poor patient compliance. It is often the case that drug abusers revert back to their addiction immediately after discharge, despite efforts of the hospital staff to prevent this from occurring. Therefore, educating children, parents and teachers is the best course of action to decrease experimentation and inhalant abuse and prevent irreversible damage from these toxic inhalants.

References