

SHORT REPORT

Mercury intoxication presenting with tics

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Abstract

A 5 year old Chinese boy presented with recurrent oral ulceration followed by motor and vocal tics. The Chinese herbal spray he used for his mouth ulcers was found to have a high mercury content. His blood mercury concentration was raised. Isolated tics as the sole presentation of mercury intoxication has not previously been reported.

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Case report

A 5 year old Chinese boy of healthy unrelated parents presented to our hospital on two occasions—initially with oral ulceration, and then with motor and vocal tics. The oral ulceration, which mainly affected the left lateral aspect of his tongue, appeared approximately five weeks prior to the onset of tics. Herpetic ulceration was diagnosed and confirmed by the isolation of herpes simplex virus (HSV) type 1 from his tongue swab. The lesion improved after treatment with a five day course of oral acyclovir (200 mg five times daily), but relapsed a few days after finishing the course of medication. The family then consulted a local pharmacist who prescribed for the child a Chinese medicinal herb (CMH) mouth spray, named “Watermelon Frost”. The spray was said to be useful in controlling pain and healing difficult mucosal wounds.

Over the following weeks, his mother noticed an improvement in his oral symptoms but commented that he had become irritable and had been clearing his throat frequently. A transient skin rash was also noticed on his trunk a few days before his second admission. On the day of admission, he developed a sudden onset of motor tics that consisted of eye blinking, head turning, and shoulder shrugging. There was no preceding history of flu like symptoms, head injury, or consumption of other drugs or herbs. His general health had been good and his developmental milestones were normal. There was no family history of any psychiatric or neurological problems. He had been on a normal unrestricted diet and there was no history of excessive seafood consumption.

He looked well on examination, which was interrupted by episodes of motor tics as described. Blood pressure was 110/65 mm Hg

and heart rate 96 beats per minute. No skin rash or desquamation on the palms and soles were noted. There was a small healing ulcer at the tip of his tongue. His speech and gait were normal. Cardiovascular, respiratory, abdominal, and neurological examination did not reveal any abnormalities.

Initial investigations including complete blood count, renal function tests and electrolytes, liver enzymes, immunoglobulins, complement, as well as urine analysis and toxicology screen were all normal. Electroencephalography, cranial computerised tomography, and magnetic resonance imaging were also normal. Serum antineuronal antibody as determined by flow cytometry (less than 5 MIF units) and ASOT (less than 60 Todd units) were not raised.

On further questioning, our patient admitted that he had been using the CMH mouth spray up to 20 times a day for the preceding four weeks, when the recommended dose was only one spray twice a day. As the use of herbal medication always arouses the suspicion of heavy metal exposure in the locality, screening for heavy metals was performed.

The herbal spray was digested with concentrated nitric acid (12 mmol/l) for five days at room temperature, and total mercury concentration was then measured by cold vapour atomic absorption spectrophotometry (Flow Injection Mercury System, Perkin Elmer Corp., Norwalk, Connecticut, USA). Arsenic, manganese, and lead contents were determined by graphite furnace atomic absorption spectrophotometry (SIMAA 6000 Analyser, Perkin Elmer Corp.). The blood concentrations for lead and manganese were 0.31 $\mu\text{mol/l}$ (normal <1.5 $\mu\text{mol/l}$) and 246 nmol/l (normal 70–280 nmol/l); urine arsenic was 10 nmol/mmol creatinine (normal <68 nmol/mmol). Blood mercury concentration was 83 nmol/l (normal for adults <50 nmol/l). The mercury content of the spray was 878 ppm (2% methylmercury and 98% inorganic mercury). There was also a significant difference in mercury content between different brands as well as batches of the same brand of CMH (see table 1). Sensory and motor nerve conduction velocities in our patient were normal. Detailed neuropsychological assessment was also normal.

The CMH spray was discontinued on admission. As the patient was clinically stable and his neurological symptoms improving,

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Table 1 Mercury content of different preparations of "Watermelon Frost"

Brand*	Total mercury content (ppm)		
	First trial	Second trial	Third trial
A1	1242	1198	1195
A2	0.110	0.461	ND
A3	0.300	0.338	ND
B	0.059	0.059	ND
C	85.3	94.6	95.0
D	0.197	0.132	0.165

A1, the "Watermelon Frost" that our patient used in January 1999; A2 and A3, different batches of the same brand as the one taken by our patient (bought for testing in September 1999); B, different brand; C, internal positive control; D, external positive control (a lyophilised mussel tissue from the US National Institute of Standards and Technology, Gaithersbury, Maryland, USA with a certified consensus value of 0.176 ± 0.013 ppm).

*Triplicate samples were pretreated by microwave digestion in concentrated nitric acid under 60 psi for 40 minutes before analysis for mercury.

ND, not done (due to leakage of material after microwave digestion).

chelating therapy was not considered to be necessary. His tics completely resolved at follow up four weeks later. His blood mercury level also returned to normal. When he was seen again six months after discharge, he was asymptomatic despite new ulcers appearing on his tongue. On that visit, detailed immunological investigations including enumeration of peripheral blood lymphocyte subsets and their proliferative responses to mitogens were performed and yielded normal results.

Discussion

The aetiology of tics is poorly understood. Neurological dysfunction has been proposed as one of the many possible causative factors. Evidence to support this includes: (1) the onset of new tics or accentuation of pre-existing tics in some patients treated with stimulant medications such as methylphenidate¹; (2) reduction of symptoms during treatment with medications that affect neurotransmitters in the brain, such as haloperidol.

It has been suggested that the primary problem in tic disorder is an imbalance in central neurotransmitters. In cases of mercury poisoning, the metal combines with the sulphhydryl group of S-adenosylmethionine, which acts as a cofactor for catecholamine-o-methyltransferase (COMT). Inhibition of COMT leading to accumulation of catecholamines, which act as important neurotransmitters, may explain the pathophysiology of tics in cases of mercury intoxication.²

The manifestations of mercury toxicity vary, depending on the chemical form of the mercury compound and patient sensitivity. In chronic inorganic mercury intoxication, the predominant clinical features include gastrointestinal symptoms, renal dysfunction, and neuropsychiatric abnormalities. In contrast, organic mercury poisoning results in almost purely neurological damage that is usually permanent except in the mildest of cases. Acro-dynia, described mainly in young children, is thought to be a hypersensitivity reaction to

mercury which may occur alone or in combination with the other manifestations of mercury poisoning.

Mercury intoxication with tics as the only manifestation has never been reported in the literature. The "Watermelon Frost" that our patient took contained 878 ppm of mercury, mainly in the inorganic form. Although methylmercury constituted only 2% of total mercury in the CMH preparation, the content was 18 times the action level of mercury in food as proposed by the Food and Drug Administration.³ This high mercury intake, together with the temporal association between symptom onset and increased blood mercury level, and the subsequent resolution of symptoms with normalisation of mercury concentration, make chronic mercury poisoning the most likely culprit.

We have considered infection as an alternative explanation for the appearance of tics in this child. It has been suggested that tic disorders may be triggered by an antecedent infection with group A β haemolytic streptococcus.⁴ The neurological abnormalities have been postulated to be mediated through antineuronal antibodies which appear in response to the infection. However, ASOT and antineuronal antibodies were both negative in our patient. The neurotropic herpes simplex virus might also cause unusual neurological symptoms including tics.⁵ However, this is unlikely to be the case in our patient, as his tics completely resolved once his blood mercury level was normalised and did not reappear despite new oral symptoms.

Chinese herbal medicines are widely used and easily obtainable over the counter in Hong Kong. Owing to the extensive modifications of drug formulations and chemical extraction from an expanding range of natural products, more cases of adverse reactions have been reported in recent years.⁶ Even batches of CMH from the same manufacturer may contain variable amounts of active or potential toxic ingredients, as illustrated by our case. Though still relatively rare, heavy metal poisoning with CMH should always be suspected if a previously healthy child develops unusual symptoms, especially those involving the central nervous system.

- 1 Burd L, Kerbeshian J, Fisher W, Gascon G. Anticonvulsant medications: an iatrogenic cause of tic disorder. *Can J Psychiatry* 1986;31:419-23.
- 2 Henningson C, Hoffmann S, Mcgonigle L, Winter J. Acute mercury poisoning (acro-dynia) mimicking phaeochromocytoma in an adolescent. *J Pediatr* 1993;122:252-3.
- 3 Methyl mercury (a chemical hazard). In: *Fish and fishery products hazards and controls guide*. Center for Food Safety and Applied Nutrition. Washington, DC: US Food and Drug Administration, 1998.
- 4 Kiessling L, Marcotte A, Culpepper L. Antineuronal antibodies in movement disorders. *Pediatrics* 1993;92:39-43.
- 5 Budman C, Kerjakovic M, Bruun R. Viral infection and tic exacerbation. *J Am Acad Child Adolesc Psychiatry* 1997;36:162.
- 6 Yun MW. Toxicity and side effects of some Chinese medicinal herbs. In: *Advances in Chinese medicinal materials research*. Singapore: World Scientific Publishing Company, 1985:109-24.