Mercury intoxication presenting with tics

Albert M Li, Michael H M Chan, T F Leung, Robert C K Cheung, Christopher W K Lam, T F Fok

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.

(Arch Dis Child 2000;83:174–175)

Keywords: tics; mercury poisoning; Chinese medicinal herb

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 µmol/l (normal <1.5 µmol/l) and 246 nmol/l (normal 70–280 nmol/l); urine arsenic was 10 mmol/mmol creatinine (normal <68 mmol/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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USA with a certified consensus value of 0.176

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

*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 immunologi-
cal investigations including enumeration of
peripheral blood lymphocyte subsets and their
proliferative responses to mitogens were per-
formed 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. Ev-
dence to support this includes: (1) the onset of
new tics or accentuation of pre-existing tics in
some patients treated with stimulant medica-
tions such as methylphenidate; (2) reduction
of symptoms during treatment with medica-
tions that affect neurotransmitters in the brain,
such as haloperidol.

It has been suggested that the primary prob-
lem in tic disorder is an imbalance in central
neurotransmitters. In cases of mercury poison-
ing, this metal combines with the sulphhydril
group of S-adenosylmethionine, which acts as a
cofactor for catecholamine-o-
methyltransferase (COMT). Inhibition of
COMT leading to accumulation of catechola-
mines, which act as important neurotrans-
mitters, 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 mer-
cyum compound and patient sensitivity. In
chronic inorganic mercury intoxication, the
predominant clinical features include gastro-
intestinal symptoms, renal dysfunction, and
neuropsychiatric abnormalities. In contrast,
organic mercury poisoning results in almost
purely neurological damage that is usually per-
manent except in the mildest of cases. Acrody-
nia, described mainly in young children, is
thought to be a hypersensitivity reaction to
mercury which may occur alone or in combina-
tion 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 methyl-
mercury 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 Administra-
tion.3 This high mercury intake, together with
the temporal association between symptom onset and increased blood mercury
level, and the subsequent resolution of symp-
toms with normalisation of mercury concen-
tration, make chronic mercury poisoning the most
likely culprit.

We have considered infection as an alterna-
tive explanation for the appearance of tics in
this child. It has been suggested that tic disor-
ders may be triggered by an antecedent in-
fec tion with group A β haemolytic streptococcus.4 The neurological abnormalities
have been postulated to be mediated through
antineuronal antibodies which appear in re-

sponse 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 sus-
pected if a previously healthy child develops
unusual symptoms, especially those involving
the central nervous system.

medications: an iatrogenic cause of tic disorder. Can J Psy-
chiatry 1986;31:419–23.

mercury poisoning (acrodynia) mimicking phaeochromo-


3. Methyl mercury (a chemical hazard). In: Fish and fishery
products hazards and controls guides. Center for Food Safety
and Applied Nutrition. Washington, DC: US Food and

4. Koebling L, Marcotte A, Culpepper L. Antineuronal

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 medi-
cinal herbs. In: Advances in Chinese medicinal materials
research. Singapore: World Scientific Publishing Company,

Table 1 Mercury content of different preparations of
“Watermelon Frost”

<table>
<thead>
<tr>
<th>Brand*</th>
<th>First trial</th>
<th>Second trial</th>
<th>Third trial</th>
</tr>
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<tbody>
<tr>
<td>A1</td>
<td>1242</td>
<td>1198</td>
<td>1195</td>
</tr>
<tr>
<td>A2</td>
<td>0.110</td>
<td>0.461</td>
<td>ND</td>
</tr>
<tr>
<td>A3</td>
<td>0.300</td>
<td>0.338</td>
<td>ND</td>
</tr>
<tr>
<td>B</td>
<td>0.059</td>
<td>0.059</td>
<td>ND</td>
</tr>
<tr>
<td>C</td>
<td>85.3</td>
<td>94.6</td>
<td>95.0</td>
</tr>
<tr>
<td>D</td>
<td>0.197</td>
<td>0.132</td>
<td>0.165</td>
</tr>
</tbody>
</table>

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, a
different brand; C, internal positive control; D, external positive
control (a lyophilised mussel tissue from the US National Insti-
tute of Standards and Technology, Gaithersberg, Maryland, USA with a certified consensus value of 0.176 ± 0.013 ppm).

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