Severe Mercury Poisoning in a Pediatric Patient Due to Mexican Facial Cream Use

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Introduction

Mercury (Hg) comes in a variety of forms: organic, elemental and inorganic. The constellation of symptoms seen with inorganic mercury often overlap with a number of equally uncommon medical conditions. For example, the yperadrenergic signs including hypertension and tachycardia occur due to covalent binding of Hg to sulfhydryl groups and subsequent inhibition of S-adenosylmethione (SAM) and catecholamine-O-methyltransferase (COMT). As a result of the inhibition of catecholamine processing and the resulting physiological effects, a preliminary diagnosis of pheochromocytoma is often entertained.

In addition, pediatric patients with Hg poisoning may present with an additional symptom of acrodynia, a dermal manifestation of the Hg accumulation causing diffuse erythema, edema and desquamation of the hands and feet. The resulting condition may be misdiagnosed as Kawasaki disease.

The following case presents a pediatric patient presenting with inorganic mercury poisoning due to dermal contact with an acne facial cream containing high levels of mercurous chloride. The product was obtained in Mexico and brought back to California by the family. The case illustrates the progression and manifestation of a variety of symptoms throughout the course of the pediatric patient's Hg exposure and the inconsistencies present in each diagnosis before Hg poisoning was considered. The challenge of diagnosing Hg poisoning is further extrapolated from the results of the patient presentations in the report.

Image 1. Sample predominately used by our patient: 96,000 ppm Hg.

Image 2. Unused and unlabeled: 110,000 ppm Hg.

Image 3. Sample predominately used by uncle of our patient: 210,000 ppm Hg.

Case Presentation

A previously healthy 17-year-old boy presented to his primary care physician for lower extremity weakness. Ten days prior he lost balance at soccer practice; legs swayed and he felt uncoordinated. He also described a tingling sensation of his chest, arms and legs. The low back pain was worse on standing and sitting, no pain when lying down. Further history also revealed intermittent insomnia. He returned after 1 week with worsening back pain but normal ambulation and normal physical exam. Naproxen, acetaminophen with codeine prescribed and physical therapy referral placed. No neurological deficits noted on exam and MRI of thoracic and lumbar spine was normal. His BP was elevated at 148/84. Labs to date were. Follow up neurology clinic visit revealed fasciculations in the arms and legs bilaterally. His EMG demonstrated diffuse fasciculations with decrease of amplitudes, myopathic more likely than neuropathic pattern. He was given a preliminary diagnosis of a post viral syndrome. Approximately 5 weeks after the initial symptoms, he presented to the hospital with severe low back pain, not improved with prednisone and hydrocodone. Physical exam was significant for leg tremors, face and upper extremity twitching, hypertension (170/90 mmHg) and persistent tachycardia (150 bpm). Renal function was normal. His parents mentioned severe sleep disturbances with insomnia, mumbling and agitated sleep periods. Hypertension persisted despite lisinopril and Hydralazine. Prednisone was stopped. Large muscle Fasciculations and hallucinations with sleep did not improved with benzodiazepines. He had several episodes of partial seizures and EEG signal abnormality in the right frontocentral area.

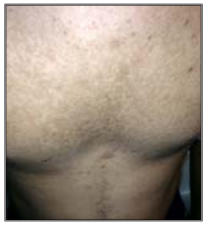

Image 4. Patient's chest

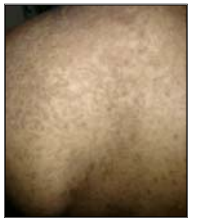

Image 5. Patient's back

CATECHOLAMINES	1606	pg/mL
EPINEPH	236	pg/mL
METANEPHS TOT SERUM	455	(Range < 205 pg/mL)
NORMETANEPHRINE, SERUM	336	(Range: < 148 pg/mL)

Approximately 6 weeks after the onset of symptoms and 3 months after discontinuation of product use, our toxicology service was consulted and mercury levels obtained. The initial 24-hour urine mercury was 244 mcg/L He was started on a 19-day oral regimen of succimer. His blood pressure was managed with diltiazem. Pain management, insomnia and frequent hallucinations were managed with amitriptyline. Fasciculations, back pain and insomnia were still present but improving at 3 months following initial presentation. At 6 months follow-up he was able to rejoin his soccer team but continued on diltiazem for persistent hypertension and tachycardia. Coordinated efforts with state and local health department revealed several unlabeled jars of acne facial cream (Images 1, 2, 3) from Mexico containing mercurous chloride ranging from 96,00-210,000 ppm Hg. Lumex measurements in the patient's room were 2.6 mcg/mm^3 of Hg (reference average, 5 ng/mm^3). The patient used the facial cream daily for approximately 6 weeks prior to his first health care visit.

Case Discussion

Inorganic Hg poisoning due to dermal contact with foreign cosmetics still exists in the United States despite a overall decline in Hg toxicity. Pediatric cases of mercury poisoning from facial creams have seldom been reported

In this case, the patient exhibited initial signs of Hg poisoning with pain, insomnia and hypertension. Neurotoxicity from Hg poisoning was seen to a significant degree with the patient's muscle weakness, tingling, ataxia, fasciculations and unrelenting neuropathic pain progressing to tremors, twitching, mumbling, agitation, and hallucinations with sleep. These symptoms, along with tachycardia and hypertension unresponsive to routine medications, necessitated hospitalization and led to the differential diagnosis of pheochromocytoma.

This constellation of fasciculations, insomnia, severe pain and hyperadrenergic signs prompted urine Hg testing. Prompt communication with the local and state health departments at that point were crucial in identifying the acne cream and sourcing it back to Mexico. There were 9 family members living in the home at the time. Surface and air sampling revealed high levels of contamination. A number of volunteer organizations were involved our families situation and support. There was an international effort to identify and test deported family members and determine the source of the cream in Mexico.

Previous cases of mercury poisoning by our group involved middle aged women using beauty creams. As see in this case, it is important to obtain a full medication history in adolescents using various acne treatments. The etiology of the seizures remains unknown. Seizures are not previously thought to be a result of mercury poisoning.

Hg poisoning in pediatric patients is most commonly confused with pheochromocytoma and Kawasaki disease. Patients presenting with similar symptoms to pheochromocytoma yet with an incomplete picture of either should prompt an evaluation for Hg poisoning.

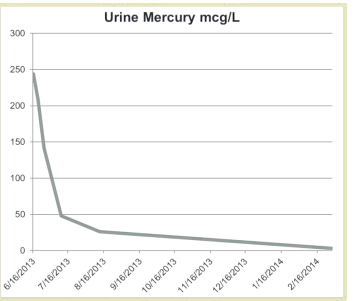

Figure 1. 24-hour urine mercury levels. Succimer administration began 6/2/2013. The first mercury level was obtain approximately 6 weeks after the cessation of use of the product.

Conclusion

Determination of Hg toxicity is challenging. Increased awareness of facial products used in acne treatment in addition to the recognition of severe pain, psychiatric symptoms, and hyperadrenergic signs may lead to earlier diagnosis. This case also demonstrates an important collaboration between state and local health departments and a toxicology service. Involving state and local health departments is vital in the evaluation of family members, decontaminating the home and identifying the Hg source.