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The University of Utah
Utah Poison Control Center

TRINKET-ASSOCIATED LEAD TOXICITY

by Peter Golden, PharmD Candidate

Introduction

The prevalence of elevated blood lead concentrations (BLC > 10 mcg/dL) in children has dropped dramatically over the last few decades from over 88.2% of children age 1 to 5 years in 1976-1980 to 2.2% in 1999-2000. (Meyer 2003). The primary source of lead exposure in children is dust and soil contaminated with lead from paint and other industrial sources. A relatively new source of poisoning is lead-containing jewelry and toy charms/trinkets. These lead-containing items may be found at dollar stores, in vending machines at department and grocery stores and even as a free gift with the purchase of a larger item, such as shoes. These charms and trinkets are often mass produced in countries that have limited standards for lead content in manufactured products. (Berg 2006)

Case Example

In 2006, a 4-year-old boy with a history of microcephaly and developmental delay died

from lead poisoning after ingesting a lead charm. (Berg 2006) The charm was attached to a bracelet that was a free gift with a purchase of a pair of shoes. The boy was brought to the pediatric emergency department (ED) with a history of vomiting. He was diagnosed with probable viral gastroenteritis, given a dose of ondansetron and discharged to home. He was brought back to the ED 2 days later with intractable vomiting, abdominal pain and dehydration. He was admitted for intravenous rehydration. The following day he became agitated, combative and developed what was thought to be posturing. He was sent to the radiology department for computerized tomography (CT) and enroute suffered a respiratory arrest and seizure-like activity. A CT scan revealed cerebral edema. A heart-shaped object was noted on the abdominal radiograph and was initially thought to be a temperature probe. Upon later examination of the radiograph it was recognized as a foreign object. A BLC of 180 mcg/dL was reported the following day. A cerebral blood flow study showed no blood flow and the child was subsequently removed from life support and died.

Lead Poisoning in Children

While this recent case highlights the tragic consequences of lead poisoning, it is unfortunately not the first case to be reported. In 1998 Wal-Mart recalled trinkets with the letters WWJD for "What Would Jesus Do" when the trinkets were linked to lead poisoning in a 2 year old boy. (Schakowsky). In 2003, the Consumer Product Safety Commission (CPSC) announced a recall of 1.4 million toy necklaces that contained high concentrations of lead after a report of lead poisoning in a toddler. (CPSC 2003; Pickner 2004) In 2004, the CPSC announced a recall of over 150 million pieces of toy jewelry sold in vending machines. (CPSC 2004) In 2005, the CPSC announced a new policy to address lead in children's metal jewelry. This policy triggers action when any part of the jewelry contains lead greater than 600 ppm. (CPSC 2005) The lead trinket

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E-NEWSLETTER

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NATIONAL POISON PREVENTION WEEK 2007

National Poison Prevention Week (NPPW) is March 18 – 24, 2007. "Children Act Fast, So Do Poisons" is the theme. It reminds us that young children need constant close supervision by responsible adults to keep them safe. This week highlights the dangers of unintentional poisonings, steps that can be taken to reduce risks, and what to do in case of an emergency. The Utah Poison Control Center (UPCC) receives more than 53,000 calls each year and 60 percent involve children less than 6 years of age. Educating each new generation of parents and other childcare providers must remain a priority to help ensure that potential poisonings are reduced. Poison prevention messages always include the importance of child-resistant packaging, storing medicines and household products in their original containers, and locking potentially dangerous items out of sight and reach of children.

Please join us in celebrating this important week by promoting awareness to poison prevention. There are countless ways to promote NPPW in your community:

- Set up a display or bulletin board about poisons, poison prevention or Poison Help.
- Give poison prevention presentations to local school children and community groups (Power Point presentations and videos are available from the Utah Poison Control Center).
- Distribute poison prevention pamphlets.
- Hand out telephone stickers with the poison center telephone number.
- Send NPPW information to community newspapers and newsletters.
- Organize a poster contest at a local school. Your student could be the next national winner. (Contact the poison center educator for guidelines.)
- Encourage discarding of expired medicines.
- Make sure that every phone at your home has a poison center telephone sticker on it.

Checkout our website for more poison prevention information at **www.utahpoisoncontrol.org**

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Trinket-Associated Lead Toxicity

removed from the 4-year-old child who died in 2006 contained 99.1% lead. Tests conducted independently by the Minnesota Public Health Department and the Centers for Disease Control and Prevention (CDC) found the lead content in other charms collected from shoes purchased in Minneapolis, Atlanta and through the internet from the same shoe manufacturer to be highly variable ranging from 0.004% to 67% lead.

The prevalence of elevated blood lead concentrations in children 1-5 years of age has declined significantly. The CDC has lowered the BLC of concern over the last 40 years from 60 mcg/dL to 25 mcg/dL and finally to 10 mcg/dL in 1991. There are data that suggest adverse health consequences of lead may occur at concentrations lower than 10 mcg/dL in young children. (Smith 1985) However, the Advisory Committee on Childhood Lead Poisoning Prevention found no valid reasons to lower the BLC of concern to lower than 10 mcg/dL. (CDC 2005)

State and local health districts receiving funding for lead poisoning prevention have been tasked with identifying strategies to eliminate lead poisoning in children. On a federal level, the CDC and federal partners have launched new initiatives to try to control lead-based paint hazards in high risk housing. The CDC, in cooperation with other federal partners, is also developing strategies to identify and eliminate non-paint sources of lead, including jewelry. (CDC 2005)

Clinical Toxicology

The adverse health consequences of lead are caused by the gradual accumulation of lead in the body. The body burden of lead may take days or months to reach toxic levels depending on the exposure. In the case of the lead-based jewelry and trinkets, lead exposure may be quite high and toxicity can occur very rapidly. In contrast, development of lead poisoning following ingestion of dust containing lead-paint, soil or lead-based paint chips develops gradually. Signs and symptoms of lead poisoning are very non-specific which can make the diagnosis difficult. Even more subtle are cognitive effects which may not show up until the child enters school. (Jason 1980) The major, life-threatening concern from lead exposure in children is encephalopathy. The diagnosis can be difficult as is illustrated by the case of the four-year-old boy who died after swallowing the lead-based charm. The progression of lead poisoning is highly variable. Patients may present with more subtle gastrointestinal and other non-specific effects or may present initially with intractable seizures that quickly advances to coma and death.

In general, as BLC increases so does the severity of signs and symptoms. Severity of symptoms also varies by age. Children are more susceptible to neurologic consequences of lead exposure. Because signs and symptoms can be so non-specific, clinicians should include lead poisoning in the differential diagnosis, especially in children with a history of pica or ingestion of foreign object. An abdominal radiograph can assist in location of the foreign object. A blood lead concentration should be obtained in all situations where ingestion of a possible lead-based foreign object is suspected. An attempt should be made to facilitate the removal of the lead foreign object through the use of whole bowel irrigation with a polyethylene glycol electrolyte solution. Children with chronic lead poisoning are likely to present with a normocytic or microcytic anemia. Elevated BUN, serum creatinine, and serum transaminases are also possible.

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Trinket-Associated Lead Toxicity

Antidotal Treatment

Children with signs of encephalopathy and BLC > 45 mcg/dL should be treated with dimercaprol followed by calcium disodium EDTA. Symptomatic children without encephalopathy can be treated with oral succimer or parenteral calcium disodium EDTA. Asymptomatic children with BLC >45 mcg/dL should be treated with oral succimer. Chelation of children with BLC < 45 mcg/dL is controversial.

Succimer can be used even if lead is still in the gastrointestinal tract. A 21-month-old girl ingested two BB pellets and became hyperactive after 6 hours. An abdominal radiograph identified 2 rounded densities in the duodenal bulb and the child was admitted for whole bowel irrigation with polyethylene glycol electrolyte solution. A blood lead concentration on admission was 47 mcg/dL. A radiograph 24 hours after admission showed the two round densities in the cecal region. The child was started on succimer. A BLC 24-hours after admission was 48 mcg/dL. A follow-up radiograph showed the pellets had not moved. The child was transferred to a tertiary facility where the pellets were removed via colonscopy. The child completed a 19-day course of succimer. A follow-up blood lead concentration 10 days after discharge was 16 mcg/dL. In this case, the BLC did not increase while the child was receiving succimer treatment despite the continued presence of the lead objects in the GI tract. (Clifton 2002)

Summary

While the prevalence of elevated BLC in children is declining in the United States, new non-paint, high-dose sources of lead poisoning are emerging. Trinkets and jewelry imported from other countries are an important potential source of lead in children. Despite the recall of millions of trinkets that possibly contain lead, it is likely that lead-containing jewelry and trinkets are still widely available in homes and continue to be a public health concern. National efforts are focused on eliminating sources of lead from a child's environment as the first step in lead poisoning prevention. (CDC 2005) Clinicians must remain vigilant in suspecting lead poisoning, especially in children with a history of ingesting a foreign object.

TOXINS IN THE NEWS

Duodote™ has been FDA approved for use by trained emergency medical services personnel to treat life-threatening **organophosphate poisoning** (nerve agents, insecticides). Duodote™ is a single, dual-chambered auto-injector containing atropine (2.1mg) and pralidoxime chloride (600mg). The auto-injector is a pre-filled, ready-to-use unit. It replaces the Mark I™ Nerve Agent Auto-Injector Kit that contains two separate auto-injectors.

Cyanokit ® (containing the drug hydroxocobalamin, intravenous tubing and a sterile spike for reconstituting the drug product with saline) has been approved by the FDA for the treatment of known or suspected **cyanide poisoning**. The most frequently reported adverse reactions are red urine, skin redness, a temporary increase in blood pressure, headache, nausea, injection site reactions, and mild allergic reactions. In the presence of cyanide, hydroxocobalamin binds the cyanide and becomes vitamin B12.

Methadone: Death and life-threatening adverse events such as respiratory depression and cardiac arrhythmias have been reported in patients receiving methadone. These adverse events are the possible result of unintentional methadone overdoses, drug interactions, and methadone's cardiac toxicity (QT prolongation and Torsades de Pointes). It has unique toxicities and pharmacologic properties compared to other narcotics. Methadone's elimination half-life (8-59 hr) is longer than its duration of analgesic action (4-8 hr).

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MEET THE UPCC STAFF

MIKE ANDRUS started as an intern with the poison control center in August of 2005. He received his BS in biochemistry from the University of Utah in 2002 and recently graduated from the PharmD program there. In his free time, he enjoys cross-country skiing, running, and backpacking. A native of Salt Lake City, Mike grew up in the Holladay area. Toxicology interests include carbon monoxide, ethylene glycol, anticholinergic poisonings, serotonin syndrome, acetaminophen, and tricyclic antidepressants.

POISON Help
1-800-222-1222

M-44 SODIUM CYANIDE

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Bureau of Wildlife Services would like us to remind you that the M-44 sodium cyanide device is used in Utah. The device is tubular and is placed in the ground with 1.5 inches sticking out of the ground baited with meat. This device is used in specific situations to control coyotes, redfox, gray fox and wild dogs. The purpose of the device is to protect livestock, poultry, and endangered species and to prevent the spread of disease. Although this device is primarily used on private lands, it may also be used on federal land in any county in the state. Areas where it is used are marked with signs. While human exposure to this device would be extremely unlikely, it is important to know that this device contains 91% sodium cyanide. Please report any exposure to this device to the Utah Poison Control Center at (801) 581-7504 or (800) 222-1222. We thank you in advance for your assistance.

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*CSPI denotes Certified Specialist in Poison Information.

THANK YOU

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