

Location: Outpatient Clinic, Pediatrics.

Vital signs: Normal.

C.C: 2-1/2-year-old girl with abdominal pain and constipation.

HPI:

The patient is a 2-1/2-year-old Hispanic female who presents today for evaluation of abdominal pain, constipation and anorexia that had been present for approximately eight weeks. She arrives with her parents who report that her symptoms started slowly at first with some anorexia and then slowly they began to notice that she was constipated more frequently and had complaints of abdominal pain. The parents note that the patient's stools are normal in appearance, other than being somewhat hard and round. She has had no episodes of rectal bleeding or melena. She had no complaints of nausea and has not been vomiting. The patient has not had regular medical care but has received immunizations at a local health department.

The family lives in a house built in the 1930s. They have been remodeling the home over the past year and a half including tearing down walls and refinishing the flooring. The house still has its original windows. The father works in the construction business and mainly does the initial demolition prior to putting up a new structure. Mother stays home and watches the patient. They have a school age child who is six years of age. There are no pets in the house. They have city water. The patient herself has never had trouble with constipation or anorexia prior to this time. The patient's gross motor development has been normal up until this point and she has been meeting her developmental milestones. The patient spends all of her time at home. She does not go outside of the home for day care.

How to approach this case:

This is a 2-1/2-year-old child presenting with anorexia, abdominal pain, and constipation. The differential diagnosis is rather broad and constipation is an exceedingly common problem in the pediatric population. However, this child has some red flags that might make one want to pursue a slightly different course in the workup of her constipation symptoms. First, she has not had routine health check-ups so she has not had a screening hemoglobin level to identify iron deficiency anemia nor has she presumably had a screening lead level to identify children who are high risk of lead poisoning. Both of these studies should be obtained on this patient as part of her constipation workup.

Orders:

Complete physical exam

Results:

General: The patient is well developed and well nourished, in no acute distress. HEENT:

Slightly pale conjunctivae, otherwise normal. Cardiovascular, and Lungs: Normal.

Abdomen: Bowel sounds are present but slightly diminished. Belly is soft, nontender, and slightly distended with stools felt in the left lower quadrant. Extremities are normal.

Neurologic: Nonfocal and appropriate for age.

The patient is a 2-1/2-year-old with constipation so one would want to at least treat that problem. Orders should include a bowel regimen to improve the constipation symptoms. Hypercalcemia and occult urinary tract infection may present with constipation.

Orders:

Fingerstick lead level (Unfortunately this is not available in CCS software; So you can directly obtain 'blood lead, quantitative'),

CBC with differential, routine

Basic metabolic panel, routine

Calcium level, routine

Milk of magnesia 10 cc QD,

Docusate 20 mg QD,
Urinalysis,

Follow up appointment in three to five days to review laboratory studies and see if improved.

Results:

Fingerstick lead of 70 mcg/dl,
Hemoglobin is 10.7, hematocrit is 33, MCV is slightly low at 76 cl/cell.
U/A - WNL

Discussion:

This patient has an elevated fingerstick lead. The current guidelines indicate that any level over 9 is considered elevated. The patient also has a mild decrease in her MCV and her hemoglobin and hematocrit are slightly decreased suggesting microcytic anemia. Both iron deficiency and lead poisoning can induce a microcytic anemia. As the first test to follow up with the patient's elevated fingerstick lead level, one should obtain a venous blood lead level.

Order:

Venous blood lead level.

Results:

54 mcg/dl.

Discussion:

This patient has an elevated blood lead level at a level sufficiently high to warrant treatment. Treatment is aimed at assessing the patient's environment to see what sources of lead may be contaminating the patient's environment; changing the child's behaviors, particularly hand-mouth behavior which can contribute to the ingestion of lead dust; ensuring that the child has adequate nutrition, particularly calcium and iron to decrease lead absorption; and lowering the patient's whole body lead level through chelation therapy. In general, chelation therapy is warranted when the blood lead level is greater than 45 mcg/dl. Monotherapy is indicated up to 69 mcg/dl; greater than 69 mcg/dl warrants two-drug chelation therapy.

Orders:

Home inspection for sources of lead - Type 'Lead paint assay at home'

Dietary recommendations to increase calcium in the diet to approximately 1 gram of calcium per day. This may be obtained either through milk and other dairy products or calcium-fortified orange juice as well as recommendations for iron therapy since the patient has iron deficiency or simply add an iron-containing multivitamin if the patient does not have iron deficiency.

Serum iron, ferritin, and TIBC

Succimer (DMSA) chelation therapy, oral continuous

Liver function tests, erythrocyte protoporphyrin - baseline prior to succimer therapy

Follow up in one month

If inspection reveals the home as the source of lead poisoning, then lead abatement (Type, 'Lead abatement agency') within the home is also a necessary part of this patient's plan, and the patient should be removed from the home while the abatement is occurring and while the family is remodeling.

Succimer, also known as DMSA, is the first drug of choice for children who have elevated lead levels in the 45-100 mcg/dl range, at a dosage of 350 mg/M² per dose every eight hours orally for five days and every 12 hours for another 14 days. Toxicities associated with succimer include GI distress, rashes, elevated liver function tests and depressed white blood cell count. Therefore when ordering succimer further orders include CBC and hepatic panel. One should obtain these at baseline as well.

Results:

Patient has completed the chelation therapy without any side effects.
Iron studies were normal.

Baseline liver functions were normal.

Erythrocyte protoporphyrin level was elevated.

Her constipation has improved and she no longer needs the milk of magnesium or docusate.

Orders:

Repeat lead level, (Type blood lead, quantitative)

CBC,

Erythrocyte protoporphyrin today.

Discussion:

Exposure to lead can cause subtle cognitive defects in children. Currently the accepted level for the threshold of concern is a blood lead level greater than 9 mcg/dl. Because of increased public awareness of the toxicities associated with lead, screening programs that routinely screen for lead as well as anemia have been able successfully to identify children who have increased exposure to lead and possible toxicity from it. Patient populations who are at increased risk of high lead levels include immigrant families, particularly Hispanic ones, who may use ceramic ware glazed with lead paint; children who live in poverty; who are younger than six years of age; who are African-American; or who dwell within a city. Children can have increased exposure if they live in a house or spend considerable time in a structure built before 1950 when use of lead-based paint was prevalent. Children whose family members work in areas that may have elevated lead levels (including metal refineries, battery recycling plants, maintenance workers on bridges and boats, and demolition workers) may receive "second hand" dust exposure from contaminated clothing. Other sources include window blinds, zippers, painted furniture and mineral supplements, particularly ones that have been brought to this country from a country in which lead levels are not vigorously monitored. Lead dust is a particular problem for children as it usually accumulates in places such as windowsills where paint along the window is frequently rubbed with the release of dust particles; toddlers who, because of their developmental stage, tend to mouth objects including windowsills, toys, and their hands become exposed to this dust.

Because of monitoring, most children present with asymptomatic lead poisoning that is noted on screening laboratory tests. The fingerstick lead level is the initial screening test; however, because of contamination problems, this level is frequently higher than a venous blood level and therefore any fingerstick screen that is elevated should be followed up in 48 hours with a venous blood lead level. Erythrocyte protoporphyrin levels may be elevated and can be followed to see a response to chelation.

It is felt that GI symptoms occur at approximately 50 mcg/dl; however, some data suggest that nearly half of children who have blood level levels in the 20-45 mcg/dl range may also have GI symptoms which may be misinterpreted.

Encephalopathy secondary to lead poisoning usually does not occur unless the level is exceedingly high such as over 100 mcg/dl and this will be an indication for prompt chelation therapy. As noted above, chelation therapy is recommended for levels greater than 45 mcg/dl with monotherapy being recommended for levels between 45 and 69. There are currently four different chelating agents available in the United States for lead poisoning. They are succimer, calcium edetate, BAL/dimercaprol, and D-penicillamine. Children who undergo chelation therapy can expect to have their blood lead level rebound about four to six weeks post chelation, presumably due to the release of lead from bone stores. Those children who have levels above 100 mcg are likely to have a rebound blood lead level greater than 45 mcg/dl which would warrant a second round of chelation therapy. Those children who have levels greater than 45 will generally have a rebound in their level to about two-thirds of what it had been prior to chelation therapy, and they may or may not warrant further chelation therapy. Therefore, it is important to do followup blood lead level measurements on these children.

Order review:

Followup appointment in one 4-6 weeks with erythrocyte protoporphyrin level and a blood lead level. Repeat chelation if still warranted.

Continue multivitamin with iron. Continue calcium supplementation in the diet.

Primary diagnosis:

Lead poisoning.

Note: You may get a case of lead poisoning with a different presentation. For example, child may present with fatigue, lethargy, not doing well in school; and on exam he has pallor. You order a CBC, which shows microcytic anemia and basophilic stippling etc.

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