

Lead Poisoning in a Family

Sim S. Galazka, MD
Cleveland, Ohio

Lead is well known to cause toxicity in children. If not detected early, lead poisoning can result in hematologic disorders such as anemia, and neurologic disorders such as intellectual deficits, peripheral neuropathy, and encephalopathy.¹ The Centers for Disease Control recommends the routine screening of children living in environments where they are exposed to lead. The recommended interval for routine screening is yearly for children aged 1 to 6 years using measurements of erythrocyte protoporphyrin and blood lead.

The home and work environment is the usual source of lead in cases of toxicity.^{2,3} The risk to young children in communities with deteriorating older housing with peeling paint is well known.^{4,5} Likewise, the risk to adults working in certain occupations with exposure to lead is well known.^{2,6} Exposures that put families at risk are not as clearly recognized. This case report describes an episode of lead poisoning involving all members of a family resulting from a household exposure to environmental lead.

CASE REPORT

A 2-year-old child was brought by her parents to the family practice office for routine well-child care. This child was the product of a term gestation and uncomplicated pregnancy. Birthweight was 7 lb 12 oz and her achievement of developmental milestones was normal, with walking at 12 months, first words at 10 months. At this visit she was running and able to speak in three- to four-word sentences. She was able to manipulate a cup and spoon for meals, dressed herself, and could button her clothes. Height and weight were at the 25th percentile for her age and her physical examination was normal. Routine screening tests included a capillary hematocrit determination and erythrocyte protoporphyrin measure-

ment for lead toxicity. The hematocrit was 0.39, and the erythrocyte protoporphyrin (measured as zinc protoporphyrin) was 35.2 $\mu\text{mol/L}$ (230 $\mu\text{g/dL}$). A lead level performed on the same specimen was 4.49 $\mu\text{mol/L}$ (93 $\mu\text{g/dL}$). These criteria are consistent with a class IV risk for lead poisoning according to the Centers for Disease Control system of risk classification.⁷

Further inquiry revealed that 6 weeks before the visit the family had moved from an apartment into a 100-year-old house. They were heat-stripping and sanding the old paint from the walls and woodwork and noted that there was a layer of paint dust throughout the house. The child played in the rooms where sanding was occurring, and the parents noted that "everything goes into her mouth." The child was admitted to the hospital for a course of chelation therapy (dimercaprol [BAL], 500 mg/m²/d for 3 days, and edate calcium disodium [CaEDTA], 1500 mg/m²/d for 5 days). The parents were advised of the risk of lead toxicity from paint dust and discontinued the process of stripping the woodwork and walls. The father was employed as a lacquer sprayer at a musical instrument factory and denied exposure to lead or dust in his work environment. No source of lead exposure outside the home was found for other family members. Lead levels were obtained from the child's mother, aged 30 years, father, aged 31 years, and brother, aged 6 years. The family members' lead levels are displayed in Table 1 along with follow-up levels obtained approximately 6 months later.

COMMENT

This report illustrates the risk to all family members from an environmental toxin in the home environment. Removing old paint in the home carries a risk of lead toxicity to people living in this environment during the time of paint removal.⁸⁻¹⁰ Rehabilitating old housing usually involves paint removal through heat-stripping, scraping, and sanding. To remove exterior paint, sand blasting may also be used. In older homes, the dust, fumes, and chips produced as a result of these processes contain a significant amount of lead.

Submitted, revised, July 3, 1990.

From the Department of Family Medicine, Case Western Reserve University, Cleveland, Ohio. Requests for reprints should be addressed to Sim S. Galazka, MD, Department of Family Medicine, Case Western Reserve University, School of Medicine, 2119 Abington Rd, Cleveland, OH 44106.

TABLE 1. LEAD TOXICITY IN A FAMILY

	Lead $\mu\text{mol/L}$ ($\mu\text{g/dL}$)*		Erythrocyte Protoporphyrin $\mu\text{g/dL}$ †	
	Initial	6 Months	Initial	6 Months
Patient	4.50(93)	0.95(20)	230	40
Father	3.30(68)	1.40(29)	121	56
Mother	1.35(28)	—	33	—
Brother	3.20(66)	1.00(21)	45	18

*Normal blood lead in children $<1.21 \mu\text{mol/L}$ ($<25 \mu\text{g/dL}$).
†Normal erythrocyte protoporphyrin in children $<35 \mu\text{g/dL}$.

The parents and children in this case all had significant elevations in their blood lead levels as a consequence of their efforts to improve their home. The risks involved in paint removal are not generally appreciated. In this case the parents did not understand the inherent risk to themselves and their children. Fortunately, the 2-year well-child care visit coincided with the lead exposure and included an erythrocyte protoporphyrin determination. This family practice office, understanding the high prevalence of lead toxicity in the community it serves, routinely screens children for lead poisoning. This case underscores the need for the family physician to understand the health risks in the practice community and to develop appropriate clinical interventions to limit the effects on the practice population.^{11,12} Age-appropriate lead screening and informing parents about the risks of leaded paint are important preventive strategies.

This case also illustrates the importance of considering the risk to all family members when an environmentally caused health problem is detected in one family member. Detection of lead poisoning in one child should lead to screening other children in the household. Screening is especially important in lead poisoning because the signs and symptoms of toxicity are not immediately obvious. In this case, the source of the lead was the air-borne paint dust caused by the father's stripping and sanding. Parents have been implicated in lead poisoning in other ways. Lead-containing dust brought into the home by a household member working in an occupation with a high exposure to leaded materials has been implicated as a vector in childhood lead poisoning.¹³ The occupational history

should be obtained in a way that determines risk to the worker as well as to the worker's family.

CONCLUSIONS

The potential risk of lead poisoning for all members of a household from stripping and sanding old paint is illustrated in this case. This potential source and the risk to family members should be considered when lead poisoning is encountered. If the family physician understands the risks of lead poisoning to families in their community, screening programs can be implemented to facilitate early detection, and patient education about this problem can become a part of care for all patients at potential risk.

References

1. Childhood lead poisoning—United States: Report to the Congress by the agency for toxic substances and disease registry. MMWR 1988; 37:481-485
2. Seligman PJ, Halperin WE, Mullan RJ, et al: Occupational lead poisoning in Ohio: Surveillance using workers' compensation data. Am J Public Health 1986; 76:1299-1302
3. Charney E, Kessler B, Farfel M, et al: Childhood lead poisoning: A controlled trial of the effect of dust control measures on blood lead levels. N Engl J Med 1983; 309:1089-1093
4. Lin-Fu JS: Vulnerability of children to lead exposure and toxicity. N Engl J Med 1973; 289:1229-1233
5. Sayre JW, Charney E, Vostal J, et al: House and hand dust as a potential source of childhood lead exposure. Am J Dis Child 1974; 127:167-170
6. Pollock CA, Ibel LS: Lead intoxication in paint removal workers on the Sydney Harbour Bridge. Med J Aust 1986; 145:635-639
7. Preventing lead poisoning in young children: A statement by the Centers for Disease Control, January 1985. Atlanta, Centers for Disease Control, 1985
8. Rabinowitz M, Leviton A, Bellinger D: Home refinishing, lead paint, and infant blood lead levels. Am J Public Health 1985; 75:403-404
9. Rey-Alvarez S, Menke-Hargrave T: Deleading dilemma: Pitfall in the management of childhood lead poisoning. Pediatrics 1987; 79:214-217
10. Amitai Y, Graef JW, Brown MJ, et al: Hazards of "deleading" homes of children with lead poisoning. Am J Dis Child 1987; 141:758-760
11. Galazka SS, Rodriguez GA: Integrating community medicine in a family practice center: The example of urban lead toxicity. J Fam Pract 1982; 14:333-338
12. Donsky J, Massad R: Community medicine in the training of family physicians. J Fam Pract 1979; 8:965-971
13. Wang J, Shy W, Chen J, et al: Parental occupational lead exposure and lead concentration of newborn cord blood. Am J Indust Med 1989; 15:111-115

Elective Mutism in Family Practice

Pesach Shvarztman, MD, Ishai Hornshtein, MD, Edith Klein, MD, Ayala Yechezkel, MSW, Miriam Ziv, SW, and Joseph Herman, MD

Beer-Sheva, Israel

Elective mutism is diagnosed, according to DSM III, when there is "a continuous and persistent refusal to speak in school or in other social situations, an ability to comprehend spoken language, an ability and willingness to speak to at least one person and no clinical evidence of a mental or physical disorder that would account for the refusal to speak."¹ The onset of the disorder is usually between 3 and 5 years of age, and it is more common in children who evince signs of emotional conflict—excessive shyness, susceptibility to teasing, social isolation and withdrawal, clinging, difficulty in separating from their mothers to go to school, phobias, enuresis, enuresis, negativism, and temper tantrums.² A predisposing factor can be immigration to a country in which a different language is spoken.³

The first description of the disorder was by Kussmaul⁴ in 1877; he termed it *aphasia voluntaria* to emphasize that the patients were of sound mind and forced themselves to be mute for undisclosed reasons. Most of the literature since then has been written by psychologists, psychiatrists, and social workers, and, indeed, there is no mention of the condition in standard textbooks of pediatrics and family medicine.⁵⁻⁹ A family physician, in his function as gatekeeper, is likely to be the first to encounter a case of elective mutism. Three instances are reported here diagnosed over the course of 2 years in three geographically proximate family practices serving 4500 patients of all ages.

ILLUSTRATIVE CASES

Case 1

A 9-year-old girl, an only child, was electively mute for 5 years. She had immigrated to Israel from the Caucasus region of the Union of the Soviet Socialist Republics at the age of 3 years and, until the time she was registered for kindergarten, spoke only Russian. She bore much of the responsibility for maintaining the house because her mother was severely *handicapped*. A grandmother and maternal aunt were also members of the household. Her parents had been married for only 1 year when it developed that the father was an alcoholic and prone to violence. He remained in the USSR when the family moved to Israel and to this day has no contact with his daughter, who is not clear about his whereabouts and the circumstances of the separation. The family lived in isolation from the surrounding society. The child was good at school but would not speak with her peers. Shortly after the family moved to another city, she began speaking outside the home.

Case 2

A 7-year-old middle child living with his parents and two brothers refused to speak with anyone outside the home. The family immigrated to Israel from Chile 9 years ago but were never happy, and after 6 years the mother took her three sons back to their country of origin in an attempt to take up the threads of her former life. She was not successful and rejoined her husband in Israel 1 year ago. The patient was in the fourth grade when he came to the attention of his family physician. He was doing well in school, but would not speak to his teachers or his peers. The patient attended to his homework, reading and writing Hebrew fluently, and at home he was fluent both in Spanish and in Hebrew. The family had few outside contacts and lived in modest circumstances with the father spending much of his time at work as a laborer in an industrial plant. A consultation with a speech therapist

Submitted, revised, March 12, 1990.

From the Department of Family Medicine, University Center for Health Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel. Requests for reprints should be addressed to Pesach Shvarztman, MD, Department of Family Medicine, University Center for Health Sciences, Ben-Gurion University of the Negev, POB 653, Beer-Sheva, Israel 84105.

was sought; while the child was still on the waiting list, he began to speak of his own accord.

Case 3

A 5-year-old boy was brought to the clinic by his mother for refusing to speak outside the home, where he was fluent in Russian with his parents and older sister. The family immigrated to Israel from the USSR 9 years ago, but was not comfortable in their adopted country. Both parents were embittered about their situation and felt that they were better off before immigrating. They were isolated socially and neither had learned Hebrew well. The mother recalled that the boy's older sister, too, at one time refused to speak in school, persisting in her refusal for nearly 2 years. The patient was very attached to his mother and would not leave the house without her. The father generally kept to himself and seemed remote from his family. After a few meetings between the family and their physician, the child began to speak outside the house.

DISCUSSION

The prevalence of elective mutism in school children has been reported as ranging from 0.3 to 0.6/1000 in several studies,¹⁰ although among those who have attended school for only 2 months it may be as high as 7.2/1000.¹¹ The cause is almost certainly multifactorial. Families with electively mute children seem to have much in common: social isolation, disharmony, an absent father or one who distances himself from the family by maintaining a cold and indifferent aspect, and an overprotective mother inclined to depression.¹¹ Speech difficulties in one or more of the family members are not rare, and excessive shyness is a frequent finding.¹⁰ Furthermore, children of new immigrant families are particularly prone to the disorder.³

The three electively mute children reported here seem typical of what is known about the disorder. The first patient belonged to an immigrant family that was experiencing difficulties with a new language and the mother's severe physical handicap. The child was expected to perform many adult tasks and lived in a house full of women, being quite in the dark concerning her father. The second patient also came from a family that was not happy in its country of adoption and had even been taken back to Chile for a time in the hope of a better future. His father was seldom at home. The third patient had an older sister who had been electively mute for 2 years. His, too, was

an immigrant family, much embittered over their loss of status. The boy was inordinately attached to his mother and his father kept himself remote and silent. All three families lived in considerable social isolation, perhaps their most important common denominator.

Many authors believe that the prognosis of elective mutism is good, provided that the disorder is diagnosed early and some form of intervention is undertaken. Difficulties in developing social contacts during adolescence have been reported in electively mute children followed up for long periods.^{11,12} The outcome of cases 1 and 2 suggest that the disorder may be self-limiting.

Finally, it is well to consider the effect electively mute children have on their surroundings. Teachers and professionals responsible for treating them often feel rejected, frustrated, angry, and insulted by the persistent silence with which they are faced, even when the child is functioning well at school.¹³ These feelings can lead to an emotional abandonment of the patient and can increase his sense of isolation.

Although to date elective mutism has been more within the purview of psychologists and psychiatrists, the family physician can be called on to deal with it.¹² The ease with which three cases were accumulated within a short period suggests that it is not rare.

References

1. Diagnostic and Statistical Manual of Mental Disorders, ed 3 (DSM III). Washington, DC, American Psychiatric Association, 1980
2. Kaplan HI, Sadock BJ: Modern Synopsis of Comprehensive Textbook of Psychiatry. Baltimore, Williams & Wilkins, 1981, pp 901-905
3. Bradley S, Sloman L: Elective mutism in immigrant families. *J Am Acad Child Psychiatry* 1975; 14:510-514
4. Kussmaul A: Die storungen der sprache (Banol 12. Anhang In Handbuch Der Speciellen Pathologie und Therapie). Leipzig, FOW Vogel, 1877
5. Vaughan V, McKay J, Behrman R: Nelson Textbook of Pediatrics, ed 13. Philadelphia, WB Saunders, 1987
6. Illingworth R: The Normal Child, ed 9. Edinburgh, London, Churchill Livingstone, 1987
7. Hoekelman RA: Primary Pediatric Care. St Louis, CV Mosby, 1987
8. Rakel RE: Textbook of Family Practice. Philadelphia, WB Saunders, 1984
9. Taylor RB: Family Medicine: Principles and Practice. New York, Springer-Verlag, 1983
10. Wikins RA: Comparison of elective mutism and emotional disorders in children. *Br J Psychiatry* 1985; 146:198-203
11. Hesselman S: Elective mutism in children 1877-1981. *Acta Paediatr Psychiatry* 1983; 49:197-310
12. Furst AL: Elective mutism: Report of a case successfully treated by a family doctor. *Isr J Psychiatry Relat Sci* 1989; 26:96-102
13. Meijer A: Elective mutism in children. *Isr Ann Psychiatry* 1979; 17:93-100