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Case Report
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Maternal-fetal Lead Poisoning from a Retained Bullet: The Fetus Turns 21

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Abstract

A mother who had one previous spontaneous abortion developed pre-eclampsia at term and delivered an infant with multiple congenital abnormalities which were likely related to the mother's high blood lead level. This level was due to a bullet lodged in the fourth lumbar vertebra for the previous 15 years. It rose during the third trimester from 31 to 85 micrograms per deciliter. The infant's cardio-vascular birth defects were surgically repaired and she underwent repeated chelation which reduced her blood lead level to undetectable. Her other birth defects resolved, she completed high school and is in excellent health.

Keywords: Lead poisoning; Septo-optic dysplasia; Congenital abnormalities; Hearing loss

Case Presentation

We previously reported the complicated infancy of a female delivered at term by caesarean section to a 31 year old primipara who had been shot at age 16, the bullet lodging in the body of her fourth lumbar vertebra [1,2]. The mother's blood lead (Pb/B) had risen from 31mcg/dl in her second trimester to 75 and 85 mcg/dl two months post-partum (normal Pb/B, 5mcg/dl). The infant's birth weight was 2825gm. Apgar scores were 7 and 9 at 1 and 5 min. Her birth defects were many. They included tracheobronchomalacia with compression of the left main bronchus due to a large patent ductus arteriosus, dysplasia of the aortic valve with a tortuous aorta, early bifurcation of the pulmonary artery and a large patent foramen ovale. Surgery corrected the cardiovascular abnormalities, but because of developmental delay, she underwent magnetic resonance imaging of the brain which showed partial septo-optic dysplasia with hypoplasia of the septum pellucidum, thinning of the corpus callosum, and dilated cerebral ventricles. Bilateral hearing deficits were found at 13 weeks, exceeding 55 decibels in each ear. She was discharged to home with supplementary oxygen and hearing aids.

When referred to Toxicology Clinic at 19 weeks, her initial Pb/B was 37mcg/dl. It fell to 20mcg/dl after four cycles of dimercaptosuccinic acid (DMSA) chelation, stabilizing at 4mcg/dl at 30 months, and undetectable at age 16. Her oxygen requirement resolved at age 12 months. She had recurrent left lower lobe pneumonia four times, but not after age 10. Body weight improved from the 5th centile at 12 months to the 75th centile at age 9. She progressed adequately in school, and graduated from high school at age 19. No audiograms are available.

Since our most recent report [2], the mother underwent radical nephrectomy for a clear cell carcinoma found incidentally on computed tomography of the abdomen. Renal carcinoma has been associated with occupational lead exposure in some but not all studies [3]. The lead content of the tumor and adjacent tissue was not measured. The mother's hypertension is controlled on a diuretic. She works fulltime as a housekeeper at a nursing home.

In a recent pulmonary follow-up, the mother and child described the latter's use of aerosolized albuterol for rare asthma exacerbations. Spirometry at age 17 was normal including inspiratory and expiratory flow-volume loops. Cardiology follow-up at age 18 included cardiac ultrasound which showed stable dilation (4cm) of the ascending aorta. The aortic valve was bicommisural with fusion of the right coronary-noncoronary commissure with no stenosis or regurgitation. Avoidance of contact sports and power weight-lifting was recommended. Although the cardiologist opined that the patient had been developmentally delayed, no current residual of this was described. He summarized by concluding "she is doing very well," being reassured that no further lung infections had occurred. Routine cardiology follow-up at age 22 is planned.

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Discussion

It remains unclear whether the DMSA chelations performed during weeks 18 through 24 played a role in the successful development of this patient in the face of her serious birth defects, many of which were successfully treated surgically, early in life. Such chelations of lead-exposed children at ages one to 3.5 years were of no benefit in two large series. All that can be said is that this chelation during infancy appeared well tolerated and may have been helpful. A recent report [4] raises the possibility that chelation of the mother prior to her pregnancy might have avoided the serious fetal toxicity which we have described. It seems unlikely that many toxicologists would have done so in this case, since the mother's Pb/B was only 31mcg/dl, and chelation would have been unlikely to have removed the large large reservoir of lead removed surgically a year post-partum [5]. She had no symptoms of lead poisoning, her Pb/B being measured by a hematologist only because of anemia.

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