Art in Relation to Lead Poisoning

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ABSTRACT

Lead poisoning is an ancient and modern problem. Since many artists have had exposure to lead, it is appropriate to use some of their works as a vehicle to depict the symptoms of the variable syndromes associated with lead exposure.

Lead poisoning has long been associated with art. In fact, the first clinical description of lead poisoning was written in verse in Alexipharmaca by the poet Nicander in the second century, B.C. He wrote of the symptoms associated with the ingestion of litharge and cerasse. These are lead containing compounds used in the manufacture of paint and cosmetics. Since lead has been an ingredient in ceramic glazes, metallic statuary, sculpture, paints, fine crystal, and in the production of stained glass windows, numerous artists have been exposed to and poisoned by lead to one extent or another. Thus, it seems that in a clinical description of lead poisoning, some of its symptoms could be illustrated with art work.

The classic description of the syndrome of lead poisoning is that of the chronically poisoned individual who has had a long, low level exposure to lead. Such an individual will have crampy, abdominal pain with or without abdominal tenderness as depicted in a detail of Paul Gauguin’s painting, “The Day of the God.” These symptoms may be accompanied by nausea and vomiting as Goya suggests in “Saturn Devouring His Son” and in an etching in the Caprichos series, “The Blower” (figure 1). The patient may have jaundice, anorexia, and apathy as Amedeo Modigliani’s “Portrait of Mme. Hebuterne—Yellow Sweater” may indicate. There may be weight loss but probably not as severe as that of the Fasting Buddha from Gandhara, India.

Central and peripheral nervous system effects are seen in lead poisoning. In adults the peripheral neuropathies are more common with such symptoms as wrist drop as in Max Beckmann’s “Self Portrait.” Extraocular muscle palsies may occur as in “Portrait of Casper Sturm,” a silverpoint drawing by Albrecht Durer (figure 2). Encephalopathy appears to be more common in children; however, hallucinations may happen at any age. Such an hallucination may have inspired surrealists such as Rene Magritte in the painting “Time Transfixed” (figure 3).
Other findings frequently associated with chronic lead poisoning include anemia owing to lead's interfering with heme production. The poor, pale man in Edvard Munch's "On the Beach" may have been exposed to high lead levels at a local shipyard. Renal insufficiency may be due to toxic effects on proximal convoluted tubules and glomeruli. Decreased renal blood flow may lead to abnormally low uric acid excretion and the symptoms of gout sometimes seen in chronic lead poisoning. An abstraction of renal insufficiency is suggested by Chamberlain's sculpture, "Tung Ting Hu."

A controversial topic in regard to the clinical presentation of lead poisoning is that of an association of lead, hypertension, and increased cardiovascular risk. Otto Dix's "Self Portrait as Mars" (figure 4) illustrates how a patient might perceive symptoms of hypertension. Main studies of this association use data from the National Health and Nutrition Examination Survey II.
(NHANES II) 1976–1980\textsuperscript{13,14,22,25} and the British Regional Heart Study.\textsuperscript{25} Different statistical evaluation of the data has lead to conflicting conclusions regarding what, if any, association exists between blood lead and hypertension. What has been shown is that chronic lead exposure enhances plasma renin activity with resultant increase in angiotensin I, angiotensin converting enzyme, and plasma aldosterone.\textsuperscript{7} Also, since urinary catecholamine metabolites are increased in lead poisoning, lead may actually be producing other neuroendocrine disturbances which could lead to the development of hypertension.\textsuperscript{7}

The woman with chronic low level lead exposure is said to be at no greater risk of delivering an abnormal infant.\textsuperscript{10} However, an inverse relationship between birth weight and maternal blood lead level has been reported.\textsuperscript{24} Gustav Klimt’s “Hope II” may be hoping that her level of lead exposure was low during her pregnancy since high levels of lead exposure have been associated with increased fetal wastage, stillbirth, and premature delivery.\textsuperscript{3,10} Perhaps the infant in Munch’s “The Inheritance” is such a child.

Chronic lead exposure in childhood may manifest itself in a syndrome which has the previously mentioned adult features but, in addition, is associated with developmental abnormalities.\textsuperscript{3,9,11,12,16,17,18,23,24} Irreversibly lowered scores on intelligence tests\textsuperscript{11,12,16,17} may be illustrated by a detail of the central panel of Hieronymous Bosch’s “Garden of Earthly Delights.” “Head of an Old Peasant” by Pieter Brueghel also exemplifies the mentality one might expect in an individual who as a child was exposed to chronic low levels of lead. Physical growth retardation and short stature are also features of lead poisoning.\textsuperscript{14,18,23} It is
difficult to determine just what form of dwarfism Don Sebastian de Morra suffered; however, in Velazquez’s painting, “The Dwarf,” the after effects of childhood lead poisoning might be seen. The physical growth retardation may be due to a direct negative action of lead on bone formation or may be due to interference with calcium and vitamin D metabolism.\textsuperscript{17,18} The individual in Munch’s “The Scream” may have to do so for a lowering of hearing thresholds induced by lead in early childhood.\textsuperscript{24} Certain hyperactive children may improve with chelation therapy as their blood lead levels decrease, suggesting an association between blood lead level and childhood hyperactivity.\textsuperscript{9} Giacomo Balla’s “Girl Running on the Balcony” may be hyperactive and for that reason Balla needed to show her in such a state of motion.

Acute lead poisoning may be seen more frequently now,\textsuperscript{1,8,21} especially in drug abusers, and shows some of the same symptoms as chronic, low level poisoning. In addition, there may be liver failure owing to toxic hepatitis,
acute tubular necrosis with subsequent renal failure and hypocalcemia, followed by anemia and neuropathy.\textsuperscript{4,5} In the more severe cases, patients become apneic and such acute poisoning may be fatal.\textsuperscript{1} "Convergence" by Jackson Pollock may be analogous to the symptoms of physiologic disorganization of acute lead poisoning.

In conclusion, the symptoms of lead poisoning are many and dependent upon chronicity and quantity of exposure as well as the patient's age. The younger patient with increased absorption of ingested lead\textsuperscript{6} will manifest developmental abnormalities not seen in adults. The patients who have received high concentrations of lead in a bolus will have yet another set of symptoms. It is the variability of presentation which makes the diagnosis of lead poisoning an art.

\textbf{Acknowledgments}

Thanks are extended to Ms. Linda McRae and Mr. Alan Eaker of the Fine Arts Department of the University of South Florida and Mrs. Ann Graham of SmithKline Bioscience Laboratories, Tampa, Florida, for their valuable assistance.
References


