

CHEST[®]

Official publication of the American College of Chest Physicians



Acute Mercury Vapor Poisoning in the Home

Ethan A. Natelson, Bernard J. Blumenthal and Herbert L. Fred

Chest 1971;59;677-678

DOI 10.1378/chest.59.6.677

The online version of this article, along with updated information and services can be found online on the World Wide Web at:

<http://chestjournal.chestpubs.org/content/59/6/677>

CHEST is the official journal of the American College of Chest Physicians. It has been published monthly since 1935. Copyright 1971 by the American College of Chest Physicians, 3300 Dundee Road, Northbrook, IL 60062. All rights reserved. No part of this article or PDF may be reproduced or distributed without the prior written permission of the copyright holder.

(<http://chestjournal.chestpubs.org/site/misc/reprints.xhtml>)

ISSN:0012-3692



REFERENCES

- 1 Felson B: Fundamentals of Chest Roentgenology. Philadelphia, W. B. Saunders, 1961
- 2 Aravanis C, Michaelides G: Localized interlobar effusion in congestive heart failure. Phantom lung tumor. *Dis Chest* 45:552, 1964
- 3 Takala JK, Laes T: Phantom lung tumor and bronchogenic carcinoma in the same patient. *Dis Chest* 49:652-4, 1966
- 4 Willerson JT, Fred HL, Eiband JM, et al: Roentgenogram of the month. *Dis Chest* 48:85, 1965
- 5 Laufer ST: Interlobar effusion associated with heart disease. *Nova Scotia M Bull* 25:299, 1946
- 6 Roesler H: Clinical Roentgenology of the Cardiovascular System, (Ed 2) Springfield, Ill, Charles C Thomas, 1943
- 7 Feder BH, Wilk SP: Localized interlobar effusion in heart failure: Phantom lung tumor. *Dis Chest* 30:289, 1956
- 8 Dock W: The clinical significance of some peculiarities of the circulation in the kidneys, liver, lungs and heart. *New Eng J Med* 236:773, 1947

Reprint requests: Dr. Millard, 1180 Hope Street, Bristol, Rhode Island 02809.

Acute Mercury Vapor Poisoning in the Home*

Ethan A. Natelson, M.D.,** Bernard J. Blumenthal, M.D.,† and Herbert L. Fred, M.D., F.C.C.P.‡

A patient is presented who suffered a serious respiratory illness when heat from the oven in his kitchen vaporized nearby metallic mercury. The case cautions against the indiscriminate handling of mercury and illustrates that in a nonindustrial setting, early recognition of mercury vapor poisoning can be difficult.

This report concerns a patient who manifested severe respiratory distress and bilateral pulmonary infiltrates shortly after inhalation of mercury vapor in his home.

CASE REPORT

A 50-year-old man entered the emergency room complaining of shortness of breath, cramping abdominal pain and diarrhea. He rapidly became confused and unable to provide additional information.

On physical examination, he appeared cyanotic and desperately ill. His blood pressure measured 120/70 mm Hg; pulse, 130 beats per minute; respiratory rate, 38 per minute; and oral temperature, 104°F. Rales and expiratory wheezes were audible throughout both lungs. No other abnormalities were apparent.

Electrocardiogram disclosed sinus tachycardia. Chest roentgenogram (Fig 1) demonstrated patchy, bilateral infiltrates especially in the lower lobes along the cardiac borders; heart size was at the upper limits of normal. Hematocrit

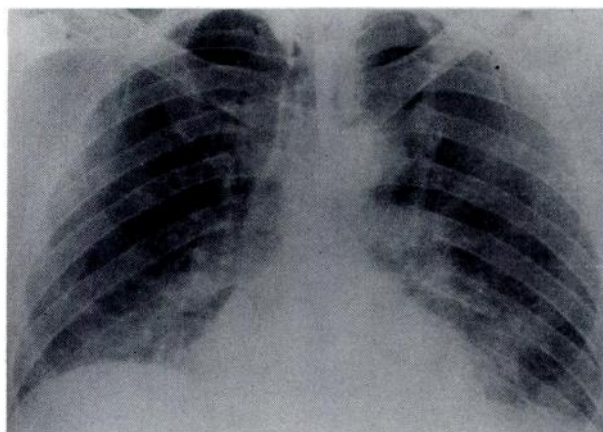


FIGURE 1. Admission roentgenogram of chest depicting bilateral pulmonary infiltrates. Nasogastric tube also is evident. value was 48 percent and total leukocyte count, 18,000/mm³. Differential white blood cell count revealed 75 percent neutrophils, 20 percent lymphocytes and 5 percent monocytes. Urinalysis, blood sugar and urea nitrogen concentrations, and values for serum sodium, potassium, chloride and CO₂ combining power were normal. A stool specimen was liquid, dark and weakly guaiac positive.

The nature of the patient's illness was obscure. Acute pulmonary edema of uncertain cause versus overwhelming bacterial pneumonia, or both, were the initial diagnostic considerations. Immediate therapy consisted of oxygen, intermittent positive pressure breathing, a nonmercurial diuretic, digitalis, and antibiotics. These measures afforded minimal clinical improvement.

Two hours after his admission the patient's wife arrived and related the following information: After cleaning the gas oven in his kitchen, the patient attempted to incinerate residual grease by setting the oven thermostat on maximum heat. The oven door remained ajar and the kitchen door and windows closed. Within 45 minutes the room became hot and the patient began to cough and have cramping abdominal pain. At the same time he noted a peculiar dust settling on the kitchen table. He telephoned his wife, described his sudden ailment to her, and then drove to the hospital. The wife disclosed that the patient was a chemical plant foreman who supervised the filling of manometers with mercury.

On the second day the patient had severe gingivo-stomatitis which gradually subsided during the next week. His dyspnea, fever, and gastrointestinal abnormalities disappeared on the third day at which time all drug therapy was discontinued. Urine collected on the fourth, fifth, and sixth days contained no detectable mercury, lead, arsenic, bismuth, antimony, selenium, or tellurium. By the tenth day, the pulmonary lesions had resolved roentgenographically (Fig 2). Six months after discharge the patient felt well and his physical examination and chest roentgenogram gave normal results.

Three days after the incident, city health authorities inspected the patient's home and noted mercury vapor concentrations as high as 0.6 mg per cubic meter of air. They also vacuumed a total of one-half pound of metallic mercury from the floors of several rooms. Meanwhile, the wife moved out of the house. One month later a team of metallurgists still found droplets of metallic mercury on the kitchen and bedroom floors, deposits of mercuric oxide coating the ceiling and walls of the kitchen, and a mercury concentration in the kitchen of 0.41 mg per cubic meter of air. At this time the household furnishings, including the rugs, were destroyed and the walls

*From the Department of Medicine, Pasadena Bayshore Hospital, Pasadena, Texas.

**Fellow in Hematology, Methodist Hospital, Baylor College of Medicine, Houston.

†Clinical Instructor in Medicine, Baylor College of Medicine.

‡Director, Medical Education, St. Joseph Hospital, Houston.

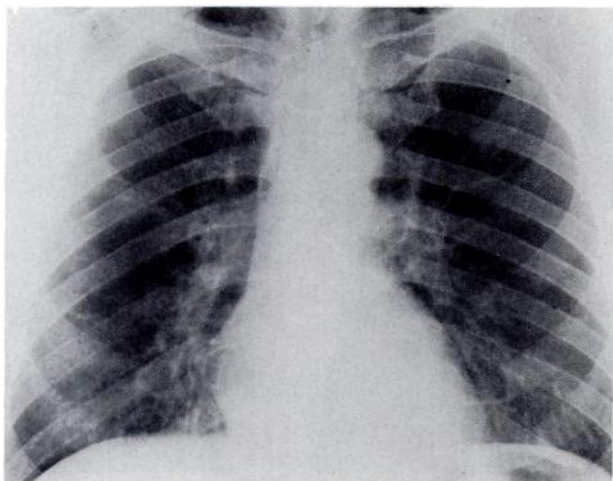


FIGURE 2. Chest roentgenogram ten days after admission.

of the home vigorously cleaned. The patient and his wife moved back into the home six weeks after the episode.

COMMENT

Inhalation of mercury vapor can give rise to acute interstitial pneumonitis and necrotizing bronchiolitis.¹⁻⁷ Although the boiling point of mercury is 357°C, detectable mercury vapor forms at temperatures as low as 8.5°C.⁸ Depending upon the surface area of mercury exposed and conditions of ventilation, air concentrations of mercury can reach 3 mg per cubic meter at room temperature^{8,9} and 213 mg per cubic meter at 200°C.¹⁰ The mercury vapor level fatal to man is not known, but concentrations of 15 to 20 mg Hg per cubic meter of air are lethal for dogs.⁹

Concentrations of mercury in lung tissue after acute mercury vapor inhalation are variable and do not correlate well with severity of the pulmonary lesions.^{5,11,12} Mercury may persist in the lungs for several months and lead to pulmonary fibrosis,⁴ but mercury vapor toxicity typically is not associated with residual lung disease.

In the present case onset of respiratory distress within an hour after exposure, acute gingivo-stomatitis,³⁻⁷ pulmonary infiltrates, and concentrations of mercury vapor in the home well above the safe level of 0.1 mg per cubic meter of air¹³ make the diagnosis of acute mercury vapor poisoning undeniable. The presence of so much mercury in the home, however, raises the question of concomitant chronic mercury poisoning in both the patient and his wife. Unfortunately, we have little definitive information on this point. She was in excellent health at the time of the accident, but specific studies for chronic mercury poisoning in her were not done. Similarly, the patient was asymptomatic and apparently healthy before the event that prompted his hospitalization.

Could exposure to mercury vapor at work have contributed to the patient's illness? Available evidence fails to support this possibility. Concentrations of mercury vapor at the plant, shortly before and after the incident, were well below the safe level. Furthermore, the patient indicated that while at work he came in contact with metallic mercury no more than twice a week and for only two hours each time. Finally, the absence of detectable

urinary mercury four days after symptoms began seems more consistent with acute^{7,11} than with chronic¹⁴ mercury vapor poisoning.

The manner in which the patient's home became saturated with mercury remains unexplained. He suggested that droplets of mercury could have splattered into his pockets or cuffs while he was at work and dislodged after he returned home. None of the materials used to clean his oven contained mercury and he denied stealing the metal.

We presume that the intense heat from our patient's oven vaporized enough mercury to cause his illness. In other reports of this unusual type of poisoning in the home, a heated stove also has played a causative role.²⁻⁶

Specific and immediate treatment with chelating agents such as dimercaprol (BAL) or N-acetyl penicillamine, clearly enhances the survival rate of patients who ingest toxic amounts of inorganic mercury. In the management of acute mercury vapor intoxication, however, the usefulness of these compounds has not been established. Our patient and others with acute mercury vapor poisoning recovered without receiving chelating agents.^{6,11,15}

REFERENCES

- Hill WH: A report on two deaths from exposure to the fumes of a di-ethyl mercury. *Canad J Pub Health* 34:158, 1943
- King GW: Acute pneumonitis due to accidental exposure to mercury vapor. *Arizona Med* 11:335, 1954
- Haddad JK, Stenberg E Jr: Bronchitis due to acute mercury inhalation. *Amer Rev Resp Dis* 88:543, 1953
- Haltee J: Diffuse lung disease caused by inhalation of mercury vapor. *Amer Rev Resp Dis* 99:430, 1969
- Matthes FT, Kirschner R, Yow MD, et al: Acute poisoning associated with inhalation of mercury vapor. Report of four cases. *Pediat* 22:675, 1958
- Campbell JS: Acute mercurial poisoning by inhalation of metallic vapour in an infant. *Canad M Ass J* 58:72, 1948
- Burke WJ, Quagliana JM: Acute inhalation mercury intoxication. *J Occup Med* 5:157, 1963
- Noe FE: Mercury as a potential hazard in medical laboratories. *New Eng J Med* 261:1002, 1959
- Fraser AM, Melville KI, Stehle RL: Mercury-laden air: The toxic concentration, the proportion absorbed, and the urinary excretion. *J Indust Hyg* 16:77, 1934
- Henderson Y, Haggard HW: *Noxious Gases and the Principles of Respiration Influencing Their Action*. (2nd Ed.), New York, Reinhold Pub. Corp., 1943, p 231
- Tennant R, Johnston HJ, Wells JB: Acute bilateral pneumonitis associated with the inhalation of mercury vapor. *Conn Med* 25:106, 1961
- Griffith GC, Butt EM, Walker J: The inorganic element content of certain human tissues. *Ann Int Med* 41:504, 1954
- Williams HL, Majer AJ, Custer JL, et al: A survey of mercury vapor hazards in hospitals. *Amer Indust Hyg Ass J* 30:186, 1969
- Battigelli MC: Mercury toxicity from industrial exposure. A critical review of the literature—Part II. *J Occup Med* 2:394, 1960
- Williams JE, Schram CFN: Acute mercurial poisoning. *Indust Med* 6:490, 1937

Reprint requests: Dr. Fred, St. Joseph Hospital, Houston 77002.

Acute Mercury Vapor Poisoning in the Home
Ethan A. Natelson, Bernard J. Blumenthal and Herbert L. Fred
Chest 1971;59; 677-678
DOI 10.1378/chest.59.6.677

This information is current as of July 29, 2010

Updated Information & Services

Updated Information and services can be found at:

<http://chestjournal.chestpubs.org/content/59/6/677>

Citations

Cited By

This article has been cited by 2 HighWire-hosted articles:

<http://chestjournal.chestpubs.org/content/59/6/677#related-urls>

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:

<http://www.chestpubs.org/site/misc/reprints.xhtml>

Reprints

Information about ordering reprints can be found online:

<http://www.chestpubs.org/site/misc/reprints.xhtml>

Citation Alerts

Receive free e-mail alerts when new articles cite this article. To sign up, select the "Services" link to the right of the online article.

Images in PowerPoint format

Figures that appear in *CHEST* articles can be downloaded for teaching purposes in PowerPoint slide format. See any online figure for directions.

