

Homicidal intravenous elemental mercury toxicity presenting with widespread vascular embolization: a case report

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Case Report

Keywords: Elemental mercury, Intravenous toxicity, Mercury poisoning, Chelation therapy, Case report

Posted Date: October 18th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11141337/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Intravenous (IV) injection of elemental mercury is an extremely rare and unconventional route of toxicant entry, typically associated with suicidal, homicidal, or accidental circumstances. Due to its non-specific multi-organ presentation, prompt clinical and radiological identification is critical to prevent severe tissue damage and organ failure.

Case Presentation:

A 48-year-old South Asian woman presented with progressive chest pain, shortness of breath, constipation, melena, and a localized maculopapular rash over the left forearm following an episode of loss of consciousness treated at a local clinic 10 days prior. Radiographs and high-resolution computed tomography (HRCT) revealed widespread metallic densities in a vascular pattern across the lungs, heart, arm, and abdominal vasculature. 24-hour urine mercury and whole blood mercury levels were markedly elevated at 42,482 ng/mL and 2,595 ng/mL, respectively. Medicolegal investigation confirmed IV mercury injection with homicidal intent. Treatment with dimercaprol chelation therapy led to clinical stabilization and discharge.

Conclusion

IV mercury exposure produces widespread vascular embolization and severe multi-organ toxicity. Early radiological recognition of characteristic metallic densities combined with prompt chelation therapy is vital for optimizing outcomes.

Background

Primary sources of human exposure to mercury stem from dental amalgam outgassing, occupational exposures (such as artisanal gold mining), or consumption of contaminated seafood [1, 2]. Acute intoxication rarely occurs through inhalation of high concentrations of metallic mercury vapor, for instance, in settings such as school chemistry laboratories [3, 4]. Intravenous (IV) injection of elemental mercury represents an exceptionally rare pathway of entry, predominantly linked to suicidal, homicidal, or accidental events. The clinical presentation varies widely, ranging from non-specific constitutional symptoms (fever, malaise) to complex multi-organ involvement (respiratory, renal, gastrointestinal, and neurological) [5]. Diagnosis is particularly challenging when history of exposure is absent or concealed. We report a rare case of systemic IV metallic mercury embolization following a homicidal attempt disguised as medical cannulation.

Case Presentation

A 48-year-old South Asian female with a medical history of hypertension and type 2 diabetes mellitus presented to the emergency department with a 7-day history of worsening chest pain and dyspnea. She reported constipation and melena for 4 days. Ten days prior, she experienced transient loss of consciousness after consuming a snack, during which she was cannulated in her left forearm and treated at a neighborhood clinic. Her background history was notable for a known right atrophic kidney and bilateral renal calculi.

On physical examination, vital signs were normal. Examination revealed bilateral cervical lymphadenopathy in the posterior triangle and a dry tongue with white specks. A maculopapular erythematous rash was present over the left forearm cannulation site, accompanied by localized thickening and erythema of the surrounding veins. Cardiovascular, respiratory, abdominal, and neurological examinations were otherwise unremarkable.

Initial biochemistry demonstrated acute kidney injury with elevated serum urea (154 mg/dL), creatinine (1.7 mg/dL), uric acid (11.9 mg/dL), and potassium (6.2 mmol/L). Subsequent evaluation on day 5 of hospitalization revealed primary hyperparathyroidism, evidenced by hypercalcemia (11.2 mg/dL), 24-hour urine calcium of 326.5 mg/day, and intact parathyroid hormone (iPTH) level of 139 pg/mL.

Radiological evaluation via chest X-ray demonstrated multiple nodular metallic densities distributed in a vascular pattern (Fig. 1A). Persistent venous changes at the left forearm cannulation site prompted an upper limb X-ray, which confirmed intravascular metallic densities. Abdominal ultrasonography revealed diffuse circumferential bowel wall thickening of the cecum, ascending colon, and proximal transverse colon with inflammatory stranding, consistent with colitis, alongside left pelvic-ureteric junction stenosis and secondary nephrolithiasis. High-resolution computed tomography (HRCT) of the chest and abdomen demonstrated linear and rounded metallic densities scattered throughout both lung fields, cardiac chambers, renal parenchyma, and thoracic aorta, causing prominent beam-hardening artifacts (Fig. 1B.).

Toxicological analysis confirmed acute IV elemental mercury poisoning, with whole blood mercury at 2,595 ng/mL and 24-hour urine mercury at 42,482 ng/mL. Medicolegal investigation by law enforcement confirmed that metallic mercury had been injected with homicidal intent during the patient's stay at the neighborhood clinic.

Chelation therapy was instituted using intramuscular dimercaprol at 5 mg/kg (300 mg) every 4 hours for 48 hours, reduced to 2.5 mg/kg (150 mg) every 6 hours for 48 hours, and continued at 2.5 mg/kg (150 mg) every 12 hours for an additional 7 days. Nebulized levosalbutamol and ipratropium bromide were administered for respiratory support. Acute kidney injury was managed conservatively.

By day 15 of chelation, the patient achieved hemodynamic stability and symptom resolution. She was discharged on intramuscular dimercaprol (150 mg twice daily for 4 days) with outpatient referrals to endocrinology (for primary hyperparathyroidism) and urology (for nephrolithiasis and pelviureteric junction obstruction).

Discussion

Intravenous injection routes result in direct distribution of elemental mercury through the venous circulation into the right heart and pulmonary vasculature. Vascular accumulation triggers localized inflammatory responses, foreign-body reaction, microvascular thrombosis, and ischemic injury. Systemic dissemination can result in acute lung injury and acute tubular necrosis in the kidneys [6].

The presence of radio-opaque, punctate vascular metallic densities on plain radiographs and CT scans is characteristic [5, 7–8]. Although chelation therapy using thiol-based agents (such as dimercaprol) remains the standard of care to facilitate urinary excretion [9], long-term prognostic data regarding localized metallic deposits in organs remain limited.

Conclusion

Intravenous metallic mercury toxicity is a rare medical emergency requiring high index of clinical suspicion. Characteristic radiological findings are key to early diagnosis, enabling prompt administration of chelation therapy to reduce organ failure.

Abbreviations

IV

Intravenous

HRCT

High-resolution computed tomography

iPTH

Intact parathyroid hormone

CT

Computed tomography

Declarations

Ethics Approval and Consent to Participate:

Not applicable

Consent for Publication:

Written informed consent was obtained from the patient's son for publication of this case report and any accompanying images, as the patient is deceased.

Competing Interests:

The authors declare that they have no competing interests

Funding:

No source of funding

Author Contribution

JV, PJ, NV and UB managed the patient. JV and SG drafted the manuscript. AS, RK, BP, PR, and NV critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

Acknowledgements:

Not applicable

Availability of Data and Materials:

No datasets were generated or analyzed during the current study

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Figures

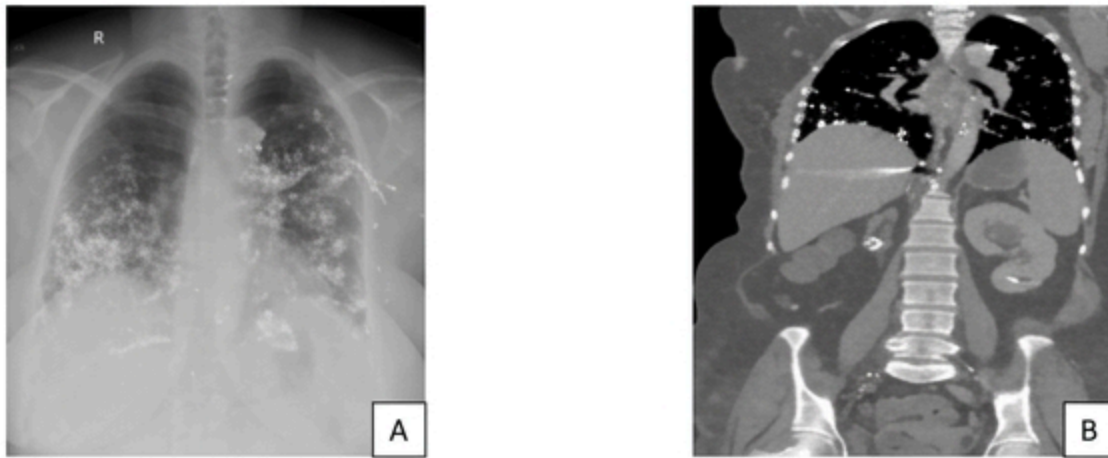


Figure 1

Imaging findings demonstrating systemic vascular distribution of mercury emboli (A) Chest radiograph showing widespread, bilateral, nodular metallic densities distributed in a lung vascular pattern (B) Computed tomography coronal reformatted soft-tissue image showing dense metallic deposits causing prominent beam-hardening artifacts within pulmonary and abdominal structures