Elemental mercury injection into the hand: A case report

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ABSTRACT

Injecting mercury for suicidal purposes is very uncommon and only a few cases have been reported. Here, we present an unusual case of injection of elementalmercury into the hand by a 27-year-old male leading to cellulitis. The need for debridement and chelation therapy based on the measured blood and urine mercury levels has been discussed.

Keywords: *Chelation therapy, Mercury, Toxicity.*

Mercury is an element that is found in soil, rocks; water and even trace amount of it can befound in the air. The poisoning of mercury, also known as hydrargyria or mercurialism can occur through inhalation, ingestion or injection in human [1]. Inhaled mercury is 80% absorbed and may result in fever, acute breathlessness which may lead to respiratory failure and death. Subcutaneous and intravenous injection ofmercury is of rare occurrence and have been administered voluntarily for suicidal purpose or its aphrodisiac effects [2]. The effects of intravenous and subcutaneous injection of liquid mercury are largely local and systemic manifestations are minimal [3]. After subcutaneous injection, mercury is oxidized in to divalent mercury (mercurous and mercuric) which is able to cohere with thiol-groups of enzyme systems, leading to tissue damage [4]. We report an unusual case of injection of elementalmercury into the hand by a 27-year-old male leading to cellulitis.

CASE REPORT

A 27-year-old male, software engineer by profession, presented to the hospital with an alleged history of injecting 2 ml of liquid mercury into the dorsum of the left hand, with intent to cause self-harm. After injecting, he noticed a local swelling at the site which was later associated with short duration of febrile illness. He had earlier visited a physician in view of pain and swelling in the hand but misled the doctor by giving a history of an insect bite. He continued to have fever spikes, constipation, and sore throat for a few days and later was admitted to the hospital after 2 weeks of treatment. Following clinical deterioration, the patient came forward and gave a history of procuring elemental mercury on Amazon (online service) and directly injecting into the vein.

On systemic examination, the patient was vitally unstable with a heart rate of 130/min and blood pressure of 76/40 mm of Hg. Local examination revealed cellulitis of the left upper limb, thrombophlebitis of the veins of the left hand and forearmandan indurated granuloma over the left dorsum.

Investigations showed leucocytosis (21,560/mm^3), renal function tests (creatinine 0.88mg/dl) and liver functions tests (total bilirubin 1.1mg/dl, SGOT-34 IU/L, SGPT-28 IU/L) were normal. Creatine phosphokinase (CPK) was within normal limits. Chest X-ray findings were unremarkable and echocardiogram (ECHO) was suggestive of good biventricular function.

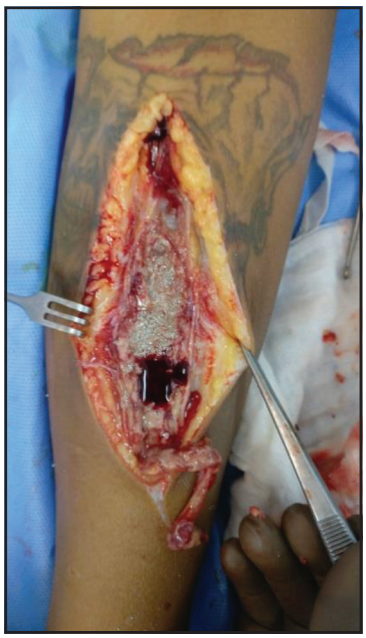

Figure 1: Intraoperative finding of thrombophelibitis and mercury deposits along the course of the vein

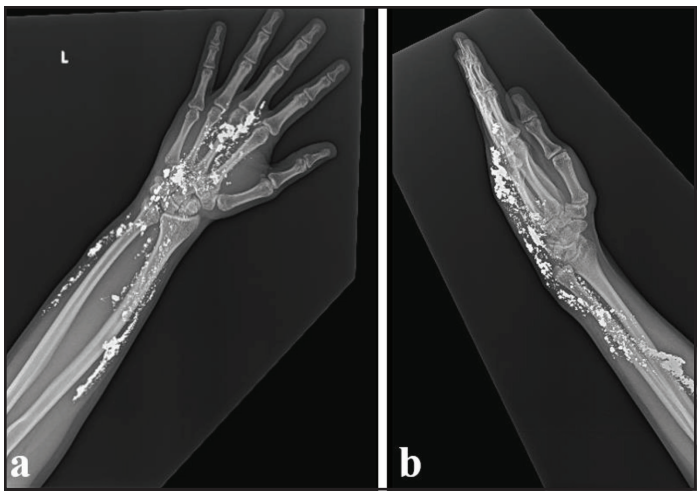

Figure 2: X-ray of (a) anterio-posterior and (b) lateral view of the forehand showing radio-opaque substances

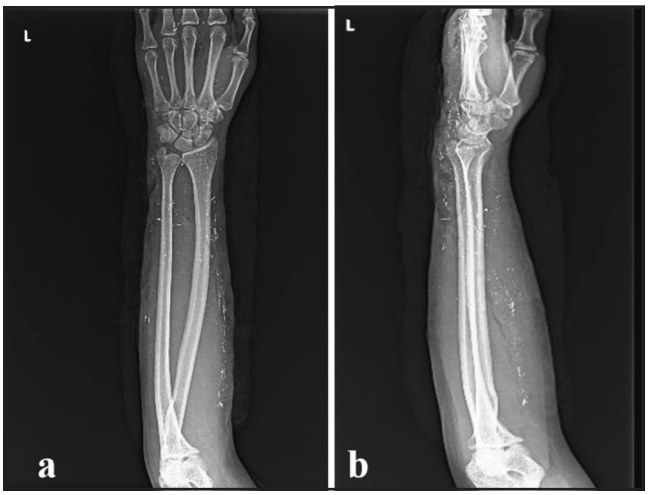

Figure 3: X-ray of (a) anterio-posterior and (b) lateral view showing decrease in radio-opaque substance post-debridement.

Since the patient was hemodynamically unstable, fluid resuscitation and vasopressors were required. The patient was treated with broad-spectrum antibiotics and underwent debridement. Intraoperatively, an incision was given along cephalic and basilica vein of the left upper limb on the dorsum of the left upper limb. Pus was seen all along the vein and visualized loose shiny mercury was removed (Fig. 1). In the forearm X-ray, a radio-opaque substance (mercury) could be seen along with the vascularity of the hand and their significant diminution post-debridement (Fig. 2 and 3).

Over the next 3 days, the patient developed pancytopenia (Hemoglobin-10.1, White blood cells - 1,410/mm^3 and platelets 145,000/mm^3). Hematologist advised for neutropenic care, barrier nursing, G-SCF (Granulocyte-colony stimulating factor) was given and debridement repeated to remove necrosed tissue. Antibiotics escalated to meropenem and teicoplanin. The pus culture from hand showed growth of acinetobacter and antibiotics de-escalated as per cultures. His blood mercury level was 5.32 ng/ml and urinary mercury level in 24 hours was 313.78 mcg/day (toxic level above 50mcg/24 hrs). Chelation therapy with dimercaprol (BAL) was started with 300mg IM 4^{th} hourly. By 48hrs, the patient refused intramuscular injection due to severe pain; hence, switched over to oral penicillamine 250 mg QID [5]. He was discharged by 1 week in stable condition with normal hemogram.

DISCUSSION

Mercury is theonly metal which stays in the liquid state at room temperature. It is available in 3 forms: (a) elemental mercury which is the liquid mercury, (b) mercury salts which are used as disinfectants and explosives and (c) organic mercury which is used in medications [6]. Diagnosis of mercury poisoning is difficult as symptoms of mercurypoisoning are subtle and may take weeks to years to manifest. The above patient had attempted to inject intravenously with liquid mercury. Abscess formation is most commonly found at the site of injection, the mercury can then gravitate to distal parts and reach various organs like lungs, mediastinum, kidneys, and brain [7].

Surgical debridement at the earliest is required to reduce the heavy metal burden in the tissues and to remove infected debris [8]. Measurement of mercury in blood and urinary excretionis required to quantify the exposure, probable toxic effects, and its management [9]. Whole blood mercury levels are useful in unstable patients with acute exposure to mercury whereas 24-hour urinary mercury levels are preferred in stable patients with chronic exposure to assess the need for chelation therapy.

Chelation therapyis indicated in symptomatic patients with whole blood mercury concentration more than 100 ng/ml or 24-hour urine concentration more than 50 mcg/24 hrs. The mercury chelators available are dimercaprol (British anti- Lewisite [BAL], unithiol (2,3- dimercaptopropane- 1-sulfonate [DMPS]) penicillamine and succimer (dimercaptosuccinic acid [DMSA]). Dimercaprol (BAL) dose is 5 mg/kgQ4H for 48 hours, then 2.5 mg/kg Q6H for 48 hours, then 2.5 mg/kg Q12H for seven days. Oral therapy with succimer or penicillamine is another option. DMSA dose is 10 mg/kg Q8H per orally for five days, then twice daily for 14 days. Penicillamine preferred dosage is 250 mg orally Q6H for five days [5].

In a case report, a 20-year-old patient presenting with fever, chest pain and hemoptysis after injecting 10 ml of mercury into the vein and was treated with penicillamine for a few months along with erythromycin for 10 days. Follow up X-ray of chest later at 6 weeks showed some reduction in the quantity of mercury deposits in the lungs [10]. Multimodal management with debridement, chelation with DMSA and DMPS, alveolar lavage, plasma exchange was successfully used in managing a middle-aged patient injected with 40 gm of intravenous mercury in a study done by Qiuying Lu et al [11]. Priya N et al described a case of a 19-year-old female with aplastic anemia and membranous nephropathy induced by intravenous mercury, treated with local excision, bronchoalveolar lavage, penicillamine, and multiple

blood transfusions [12]. Similarly, our patient also had a short duration of neutropenia which was treated accordingly. The patient had good wound healing, normal blood parameters and organ function tests during the follow-up consultation done at the end of one week.

CONCLUSION

Chelation therapy is typically not the most appropriate treatment for the postulated or even proven metal toxicity. Guidance for the physicians is needed regarding the appropriateness of chelation and most importantly chelation risks and complications. Asymptomatic or mildly symptomatic patients are unlikely to be benefitted from it and may cause harm. Fluid resuscitation, antibiotics, early removal of infected foci and mercury has vital significance than chelation therapy in patients presenting with local symptoms than the systemic involvement.

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