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Bilateral Upper Extremity Cellulitis From Injecting Crack Cocaine Dissolved in Lemon Juice: A Case Report

To the Editor: Crack cocaine is a significant public health problem in the United States, with over 354,000 past-month users in 2014.¹ While crack cocaine is typically smoked, approximately 15% of intravenous drug users report injecting crack cocaine.^{2,3} Soft tissue infections are common occurrences from the injection of nonsterile drugs, contaminants, fillers, or saliva.^{4,5} Here, we describe a patient with a long history of intravenous (IV) powder cocaine use who presented with bilateral upper extremity cellulitis after injecting crack cocaine dissolved in lemon juice.

Case report. Mr A is a 62-year-old man with a past history notable for hepatitis C and severe alcohol and cocaine use disorders. He presented to the emergency department with pain and swelling of his arms after 6 days of injecting crack cocaine. Mr A had been injecting powder cocaine for decades without these symptoms but purchased crack cocaine for the first time because he was unable to find powder cocaine. Mr A dissolved the crack cocaine in an equal proportion of lemon juice and water. The solution was more difficult to inject because he often lost the vein mid-injection. He denied any recent use or injection of other drugs.

On physical examination, the ventral surfaces of both forearms were diffusely erythematous with visible track marks. No lymphangitic streaking, crepitus, or skip lesions were noted. He was afebrile, with a leukocyte count of $11.8 \times 10^9/L$ and a C-reactive protein level of 1,112.40 nmol/L. Mr A was admitted for treatment of bilateral upper extremity cellulitis and started on IV vancomycin and piperacillin/tazobactam. Blood cultures were negative. The cellulitis improved, and IV antibiotics were transitioned to oral doxycycline and cephalexin. He was discharged 1 week later with referrals for outpatient addiction and mental health services.

This case represents a likely complication resulting from the injection of crack cocaine dissolved in lemon juice. Mr A had been injecting cocaine powder for decades without suffering any known soft tissue infections until he injected crack cocaine dissolved in lemon juice. The coinjection of lemon juice may have been the contributing factor that facilitated the development of cellulitis in this patient.

Powder cocaine (cocaine hydrochloride) is highly water soluble, allowing the drug to be insufflated or injected.⁶ On the contrary, crack cocaine (freebase form of cocaine) vaporizes at much lower temperatures, allowing for the drug to be smoked but not easily injected. A greater accessibility and reduced cost contribute to the injection of crack cocaine over powder cocaine.⁷

To make crack cocaine suitable for injection, a weak acid is required to create a charged polarized salt by the addition of a hydrogen ion.⁸ A variety of acids have been used for this purpose, including ascorbic acid (vitamin C), citric acid (such as from lemon juice), and acetic acid (vinegar).⁹ Lemon juice has been associated with abscesses⁸ and endophthalmitis,^{10,11} as well as outbreaks of disseminated candidiasis with ocular, cutaneous, and osteoarticular involvement.¹² While the mechanism for these infections is not fully understood, lemon juice is considered to be a growth medium for candida albicans⁸ and may also be particularly corrosive to veins, raising the risk of introducing pathogens into the subcutaneous space.^{5,12,13} Although research to assess whether the use of sterile citric acid reduces the likelihood of

infections or other complications is limited, some agencies have advocated for the provision of sterile, single-use citric acid powder at needle exchange sites as a harm-reduction strategy.^{14,15}

Injection of crack cocaine leads to numerous medical complications, and the use of lemon juice to convert crack to the more water-soluble form may expose users to cellulitis at the site of injection.

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