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Severe Occupational Contact Dermatitis Following Recurrent Sewage Exposure in a Plumber

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ABSTRACT: Occupational exposure to sewage-contaminated water may provoke severe cutaneous inflammation due to skin irritation and disruption of the skin's protective barrier, leading to possible secondary bacterial infection. We present the case of a 62-year-old male plumber who was exposed to sewage-contaminated water during his work, developing severe cutaneous inflammation and possible subsequent bacterial infection. The involved areas included the lower extremities, hands, anterior aspects of the forearms, and face after cleaning a sewage-contaminated residential basement. Approximately one day after exposure, the patient developed symptoms following contact with contaminated water that had soaked through his clothes and into his shoes. Some of the contaminated water also came into contact with preexisting cuts on his hands. Telephone history confirmed that he had a similar eruption several years ago following a residential sewage exposure episode. There have been no other episodes of a similar nature unrelated to his residential sewage exposure episodes. Intense itching prompted a prolonged hot shower, which the patient reported caused additional thermal injury. Laboratory evaluation showed a white blood cell count of $9.06 \times 10^3/\mu L$ and serum lactate of 1.6 mmol/L; a culture was reportedly negative after five days, although the specimen type was not independently confirmed. The patient reported improvement within approximately two days of starting amoxicillin-clavulanate, with resolution after about a week of treatment, without concurrent medication or topical treatment. The patient is thought to have developed severe occupational contact dermatitis in the form of irritant contact dermatitis, most likely caused by his recurrent exposure to sewage-contaminated water at work, with allergic contact dermatitis and secondary bacterial infection remaining possible. This case illustrates the challenge of distinguishing severe occupational dermatitis from localized infection and secondary bacterial infection, particularly when improvement occurs with antibiotic therapy.

KEYWORDS: Allergic contact dermatitis, Amoxicillin-clavulanate, Irritant contact dermatitis, Occupational contact dermatitis, Plumber, Sewage exposure, Secondary bacterial infection, Thermal injury

1. INTRODUCTION

Occupational wet work and repeated contact with irritants are established contributors to cause damage to the skin's barrier function with resulting development of irritant contact dermatitis.[1,4]

Sewage environments introduce exposure to prolonged moisture, organic material, and potentially irritating cleaning or industrial substances. Nethercott reported a number of cases of irritant contact dermatitis in individuals who worked with sewage sludge and a number of cases of allergic contact dermatitis in a wastewater treatment plant worker who developed dermatitis from sodium hypochlorite.[1,2] Sensitization to epoxy hardener in a number of workers relining sewage pipes with epoxy painted pipes has also been reported.[3] However the materials to which individual cases of contact dermatitis are exposed are not detailed.

Exposure associated eruptions that recur can indicate an occupational etiology. However, differentiation between an irritant contact dermatitis and an allergic contact dermatitis can be challenging clinically. Extensive erythema and edema can mimic bacterial cellulitis and disrupted skin may cause secondary infection. Improvement with antibiotics must be interpreted with caution, as many inflammatory eruptions could resolve with antibiotic therapy.

2. CASE PRESENTATION

A 62-year-old male plumber was seen on October 1, 2026, for erythema and swelling of his lower extremities, feet, as well as his dorsal hands, forearms, and face. One week earlier, he had cleaned and pressure washed a sewage-contaminated residential

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basement. Contaminated water soaked through his pants, shoes, and socks and splashed onto his upper extremities and face. He reported working often without gloves and the sewage-contacting previous cuts on his hands. His symptoms began one day following the exposure.

Severe itching, erythema and swelling with subsequent peeling were the major characteristics of this man's eruption. The peeling was so severe that the patient described it like shedding resembling snake skin, followed by growth of new skin. He noted a similar occurrence two to three years ago on his hands and feet after he cleaned up a sewage-contaminated residential basement. He reportedly had only two such episodes and they both occurred after being exposed to sewage. To relieve his itching, he took a long, hot shower to try and relieve it. At first, it felt as if it helped but, in the end, it caused more damage to his skin. The telephone history did not establish whether the early lesions were true fluid-filled vesicles. The patient denied any symptoms systemically during his documented emergency department evaluation. A later telephone call indicated that he had possibly had a fever, chills, swollen lymph nodes and felt ill but he could not tell for certain how long he had been feeling that ill.

The patient was comfortable and not in acute distress. Recorded vital signs included temperature 97.6°F, heart rate 60 beats/min, respiratory rate 18/min, blood pressure 109/74 mmHg, and oxygen saturation 95% on room air. Examination of the patient revealed erythema of the cheeks, nose and ears. In addition, there was erythema and scaling on the dorsal surface of the hands and on the forearms. There was patchy erythema on the knees and anterior shins and extensive bilateral erythema and edema that extended down to the feet and toes. There was a blister on the dorsal surface of the right foot and scaling on the contralateral foot. Clinical photographs of the patient's lower extremities and upper extremities are shown in Figure 1.

Laboratory evaluation showed a white blood cell count of 9.06 × 10^3/μL (local upper reference limit 8.80 × 10^3/μL), absolute neutrophil count of 6.25 × 10^3/μL, hemoglobin 14.2 g/dL, platelets 247 × 10^3/μL, creatinine 0.85 mg/dL, and lactate 1.6 mmol/L. Aspartate aminotransferase was 29 U/L, alanine aminotransferase 30 U/L, and total bilirubin 0.5 mg/dL. HIV screening, hepatitis B surface antigen, and hepatitis C antibody testing were negative. Cultures obtained during the hospital evaluation showed no growth after five days but the original specimen type was not independently confirmed. No positive wound culture, identified organism, skin biopsy, or allergy patch testing was documented.

3. MANAGEMENT AND OUTCOME

The initial outpatient assessment raised concern for possible extensive area of cellulitis or other skin and soft tissue infection and was recommended for emergency evaluation. The Emergency Department assessed and treated the patient for burns to the face and extremities, including partial thickness injuries to his hands, forearms and fingers. The patient was discharged from the Emergency Department in stable condition. On follow up, the patient reported treatment with amoxicillin-clavulanate for approximately one week and reported that itching, redness and swelling resolved within a couple of days of starting the medication and complete resolution of the eruption by the end of the treatment course. He reported no other medications or topical treatments were used during the course of his treatment. The exact dose and prescription details were provided by the patient.

During the antibiotic course the patient reported marked desquamation of the skin followed by new skin formation and return to normal skin. The improvement during antibiotic treatment brings out the possibility of a secondary bacterial infection, but neither does it help identify a pathogen or confirm that infection caused the eruption.

4. DISCUSSION

A key feature of this case is the link between the patient's exposure to sewage at home and the development of quite severe pruritic rashes on two separate occasions, years apart. That strongly suggests recurrent occupational contact dermatitis rather than separate episodes of eczema. The peeling of the palms and soles is a classic feature of vesicular hand and foot eczema, but there were no primary vesicles at follow-up.

The timing of the flare-up after sewage exposure, the symptom severity, and the site of skin involvement all point to occupational irritant contact dermatitis. It results from prolonged exposure to moisture in wet footwear, wet clothes, and wet socks, as well as contact with the sewage itself and any potential irritating chemicals present. The fact that it worsens with hot water further supports an irritant cause. Reports describe severe irritant contact dermatitis from sewage in occupationally exposed people.[1] Wet work is well associated with irritant contact dermatitis.[4] The sewage in this case is variable and complex, so it is unlikely to result from a single toxin.

Allergic contact dermatitis remains a possible alternative diagnosis. Delayed hypersensitivity to occupational materials

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(disinfectants, rubber, adhesives, epoxy, etc) has been reported in the wastewater and sewage pipe industry.[2,3] A definite diagnosis can only be reached with patch testing and/or identification of the specific allergen. A dermatological assessment and patch testing would be required to establish the etiology.

Considering the possibility of contaminated water entering an open wound and the extent of the skin breakdown with erythema and edema, a secondary bacterial infection is possible. Group A Streptococcus and Staphylococcus aureus are the organisms normally seen in cellulitis, and neither was confirmed. The patient responded clinically to amoxicillin-clavulanate within 48 hours and resolved completely within one week. No topical therapy was used. A clinical series supports amoxicillin-clavulanate for a range of skin infections, including infected eczema.[8] A bacterial superinfection is possible, but there is no evidence of an infectious etiology in this patient's eruption, and no evidence that amoxicillin-clavulanate had any anti-inflammatory effect.

Pseudomonas aeruginosa is not susceptible to amoxicillin-clavulanate, and the sewage exposure does not suggest a Pseudomonas infection.

The patient was afebrile at the time of the emergency assessment and had a near normal white blood cell count and normal lactate, findings that do not rule out a localized infection. Subsequent symptoms of subjective fever, chills, lymphadenopathy, and malaise were reported, although these were not all objectively documented. Cultures were not obtained during the initial outpatient evaluation, and the patient was referred to the burn specialist at the local hospital for further assessment. Cultures were subsequently obtained during the hospital evaluation and reportedly showed no growth after five days. However, negative cultures do not exclude a localized skin or soft tissue infection, as cellulitis and wound infections may occur without detectable bacteremia.

The extensive bilateral distribution of the lesions and associated pruritus also warrant consideration of several conditions that can clinically resemble cellulitis.[6,7]

This case report has several limitations. Firstly, it relies on the patient’s retrospective recall. Moreover, the earlier lesions are not properly described, and the chemical composition of the sewage-contaminated water was unknown. Also, the provider and dosage (mg) of Amoxicillin-Clavulanate were not specified. No microbiological studies or patch testing were done to confirm the diagnosis. Furthermore, occupational recurrence suggests exposure-related dermatitis but does not prove whether it is irritant or allergic. The improvement on amoxicillin/clavulanate does not prove a bacterial infection.

5. CONCLUSION

This is a classic case of recurrent occupational contact dermatitis likely of irritant origin. Two separate episodes of severe pruritic, widely erythematous lesions have occurred following exposure to sewage at his plumbing workplace, with no other lesions reported. Open wounds in the area at the time likely increased susceptibility to a secondary bacterial infection. Streptococcus pyogenes and/or Staphylococcus aureus were suspected, as the eruption improved during the amoxicillin-clavulanate treatment, although no organism(s) were confirmed. The timing of exposure is key to differentiating inflammatory dermatitis from allergic dermatitis from secondary infection. However, the study has limitations, and further workup would be required.

6. ACKNOWLEDGMENTS

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7. DATA AVAILABILITY

No datasets were generated or analyzed during the preparation of this case report.

Consent for publication

Verbal and written informed consent were obtained from the patient for the preparation and publication of this case report, including the use of the clinical photographs. Informed consent was obtained by the Department of Internal Medicine, Stanaford Medical Clinic.

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Figure 1. Clinical photograph demonstrating extensive erythema and swelling of the lower extremities, including the feet and knees, as well as inflammatory changes of the dorsal hands and forearms. The image documents the acute eruption following the occupational exposure.

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