

# Don't Let the Bedbugs Bite: An Unusual Presentation of Bedbug Infestation Resulting in Life-Threatening Anemia

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## PRACTICE POINTS

- There has been a resurgence in bedbug (*Cimex lectularius*) infestations in developed countries.
- Although rare, anemia due to bedbug infestation should be considered in patients presenting with anemia and a widespread pruritic papular eruption.
- A thorough history and physical examination are essential to prevent a delay in diagnosis and avoid a costly and unnecessary workup.
- Successful treatment requires a multidisciplinary approach, which includes medical management, social services, and pest control.

To the Editor:

A 61-year-old man presented to the emergency department with a rash on the right leg, generalized pruritus, and chest pain. The patient described intermittent exertional pressure-like chest pain over the last few days but had no known prior cardiac history. He also noted worsening edema of the right leg with erythema. Three months prior he had been hospitalized for a similar presentation and was diagnosed with cellulitis of the right leg. The patient was treated with a course of trimethoprim-sulfamethoxazole and permethrin cream for presumed scabies and followed up with dermatology

for the persistent generalized pruritic rash and cellulitis. At that time, he was diagnosed with stasis dermatitis with dermatitis neglecta and excoriations. He was educated on general hygiene and treated with triamcinolone, hydrophilic ointment, and pramoxine lotion for pruritus. He also was empirically treated again for scabies.

At the current presentation, preliminary investigation showed profound anemia with a hemoglobin level of 6.2 g/dL (baseline hemoglobin level 3 months prior, 13.1 g/dL). He was subsequently admitted to the general medicine ward for further investigation of severe symptomatic anemia. A medical history revealed moderate chronic obstructive pulmonary disease, hypertension, gastroesophageal reflux disease, xerosis, and fracture of the right ankle following open reduction internal fixation 6 years prior to admission. There was no history of blood loss, antiplatelet agents, or anticoagulants. He was on disability and lived in a single-room occupancy hotel. He did not report any high-risk sexual behaviors or abuse of alcohol or drugs. He actively smoked 1.5 packs of cigarettes per day for the last 30 years. He denied any allergies.

Physical examination revealed the patient was afebrile, nontoxic, disheveled, and in no acute distress. He had anicteric sclera and pale conjunctiva. The right leg appeared more erythematous and edematous compared to the left leg but without warmth or tenderness to palpation. He had innumerable 4- to 5-mm, erythematous,

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excoriated papules on the skin (Figure). His bed sheets were noted to have multiple rusty-black specks thought to be related to the crusted lesions. Physical examination was otherwise unremarkable.

Laboratory workup revealed severe iron-deficiency anemia without any evidence of hemolysis, marrow suppression, infection, or immune compromise (Table).



A and B, Excoriated pruritic maculopapular lesions on the trunk and legs.

He had a vitamin B<sub>12</sub> deficiency (197 pg/mL [reference range, 239–931 pg/mL]), but we felt it was very unlikely to be responsible for his profound, sudden-onset microcytic anemia. Further evaluation for occult bleeding revealed an unremarkable upper endoscopy with push enteroscopy and colonoscopy. An alternate etiology of the anemia could not be identified.

Subsequently, he reported multiple pruritic bug bites sustained at the hotel room where he resided and continued to note pruritus while hospitalized. Pest control inspected the hospital room and identified bedbugs, *Cimex lectularius*, among his belongings. Upon further review, his clothes and walker were found to be completely infested with these organisms in different stages of development. Treatment included blood transfusions, iron supplementation, and environmental control of the infested living space both in the hospital and at his residence, with subsequent resolution of symptoms and anemia. Two weeks following discharge, the patient no

### Patient Laboratory Workup

Laboratory Test	Result (Reference Range)
Ferritin	13.7 ng/mL (16–294 ng/mL)
Folate	6.5 ng/mL (3.5–20.0 ng/mL)
Haptoglobin	212 mg/dL (14–258 mg/dL)
Hemoglobin	6.2 g/dL <sup>a</sup> (13–18 g/dL)
Hepatitis C antibody	Negative
Human immunodeficiency virus	Negative
Iron	15 µg/dL (31–144 µg/dL)
Lactate dehydrogenase	244.1 U/L (125–243 U/L)
Mean corpuscular volume	79.6 fl (80–100 fl)
Methylmalonic acid	320 nmol/L (87–318 nmol/L)
Peripheral smear	No schistocytes
Platelet count	301 K/µL (150–440 K/µL)
Reticulocyte count	3.3% (0.5%–2.0%)
Stool ova and parasite	Negative
Total bilirubin	0.4 mg/dL (0.2–1.0 mg/dL)
Upper endoscopy with push enteroscopy and colonoscopy	Unremarkable
Vitamin B <sub>12</sub>	197 pg/mL (239–931 pg/mL)
White blood cell count; eosinophils	7 K/µL (3.5–10.6 K/µL); 7.2% (0%–7%)

<sup>a</sup>From 13.1 g/dL 3 months prior to admission.

longer reported pruritus, and his hemoglobin level had returned to baseline.

Over the last decade there has been an exponential resurgence in *C lectularius* infestations in developed countries attributed to increasing global travel, growing pesticide resistance, lack of public awareness, and inadequate pest control programs. This re-emergence has resulted in a public health problem. Although bedbugs are not known to transmit infectious diseases, severe infestation can result in notable dermatitis, iron-deficiency anemia from chronic blood loss, superinfection, allergic reactions including anaphylaxis in rare cases, and psychological distress.

Iron-deficiency anemia caused by excessive bedbug biting in infants and children has been documented as early as the 1960s.<sup>1</sup> Our knowledge of severe anemia due to bedbug infestation is limited to only 4 cases in the literature, according to a PubMed search of articles indexed for MEDLINE using the terms *bedbugs anemia* and *cimex anemia*.<sup>1-4</sup> All cases reported bedbug infestations involving personal clothing, belongings, and/or living spaces. Patient concerns at presentation ranged from lethargy and fatigue with pruritic rash to chest pain and syncope with findings of severe microcytic or normocytic anemia (hemoglobin level, 5–8 g/dL). All cases were treated supportively with blood transfusion and iron supplementation, with hemoglobin recovery after several weeks. Environmental extermination also was required to prevent recurrence.<sup>1-4</sup> Given that each bedbug blood meal is on average 7 mm<sup>3</sup>, one would have to incur a minimum of 143,000 bites to experience a blood loss of 1 L.<sup>3</sup>

The differential diagnosis for a patient with generalized pruritus should be broad and includes dermatologic conditions (eg, xerosis, atopic dermatitis, contact dermatitis, urticaria, dermatophytosis, lichen simplex chronicus, psoriasis, scabies, pediculosis corporis and pubis, other arthropod bites, bullous pemphigoid), systemic disorders (eg, renal disease, diabetes mellitus, thyroid disease, cholestasis, human immunodeficiency virus), malignancy, connective tissue disease, medication side effects, and psychogenic and neuropathic itch.

The diagnosis of *C lectularius* infestation is confirmed by finding the wingless, reddish brown, flat and oval arthropod, with adult lengths of 4 to 7 mm, approximately the size of an apple seed.<sup>5-11</sup> Bedbugs typically are active at night and feed for 3 to 10 minutes. After their feed or during the day, bedbugs will return to their nest in furniture, mattresses, beds, walls, and floors. Bedbug bites appear as small clusters or lines of pruritic erythematous papules with a central hemorrhagic puncta. Other cutaneous symptoms include isolated pruritus, papules, nodules, and bullous eruptions.<sup>7</sup> Additional signs of bedbug infestation include black fecal stains in areas of inhabitation as well as actual bedbugs feeding during the day due to overcrowding.

Treatment of pruritic localized cutaneous reactions is supportive and includes antipruritic agents, topical steroids, topical anesthetics, antihistamines, or topical or systemic antibiotics for secondary infections.<sup>5-11</sup> Systemic reactions, including anaphylaxis, are treated with epinephrine, antihistamines, and/or corticosteroids, while severe anemia is treated supportively with blood transfusions and iron supplementation.<sup>5-11</sup> To prevent reoccurrence, environmental control in the form of non-chemical and chemical treatments is crucial in controlling bedbug infestations.<sup>5-11</sup>

This case highlights the relevance of a rare but notable morbidity associated with bedbug infestation and the adverse effects of bedbugs on public health. This patient's living situation in a single-room occupancy hotel, poor hygiene, and possible cognitive impairment from his multiple medical conditions may have increased his risk for extreme bedbug infestation. With a good history, physical examination, proper inspection of the patient's belongings, and provider awareness of this epidemic, the severity of this patient's anemia may have been circumvented on the prior hospital admission and follow-up office visit. Once such an infestation is confirmed, a multidisciplinary approach including social work assistance, health services, and pest control is needed to appropriately treat the patient and the environment. Methods in preventing and managing this growing public health problem include improving hygiene, avoiding secondhand goods, and increasing awareness in the identification and proper elimination of bedbugs.<sup>5-7</sup>

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