A Case of Norwegian Scabies in a Kidney Transplant Patient

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ABSTRACT

Introduction: Crusted scabies (Norwegian scabies) is a rare and severe presentation of skin infestation caused by the mite *Sarcoptes scabiei* in patients with compromised cellular immunity. Kidney transplant patients are maintained on immunosuppressive agents, which induce impaired T cell immune response that can lead to increased risk of crusted scabies.

Case Presentation: We report a case of crusted scabies in a kidney transplant patient who presented with a diffuse skin rash. Diagnosis was delayed and misdiagnosed initially, with subsequent skin biopsy leading to an accurate diagnosis and complete recovery with definitive treatment.

Discussion: Unlike classical scabies, crusted scabies can occur in an atypical pattern that can be misdiagnosed as common skin lesions, and a skin biopsy is crucial to obtain an accurate diagnosis to receive definitive treatment.

Conclusions: Transplant recipients are at an increased risk of severe parasitic infections such as crusted scabies due to drug-induced impairment of their cell-mediated immune response, thus maintaining a high index of suspicion for crusted scabies as a differential diagnosis in transplant kidney patients is extremely important. Early histological diagnosis of crusted scabies is essential to prevent delayed or missed diagnosis and avoid unnecessary serious complications. The combination of an oral ivermectin and topical permethrin regimen resulted in excellent clinical outcomes in our case and is recommended as the standard treatment.

INTRODUCTION

Crusted scabies (Norwegian scabies) is a rare and severe presentation of skin infestation caused by the mite *Sarcoptes scabiei* in patients with compromised cellular immunity.[1] Kidney transplant patients are maintained on immunosuppressive agents, which induce impaired T cell immune response that can lead to increased risk of crusted scabies.[2] Unlike classical scabies, crusted scabies can occur in an atypical pattern that can be misdiagnosed as common skin lesions, and a skin biopsy is crucial to obtain an accurate diagnosis to receive definitive treatment.[3]

We report the case of crusted scabies in a kidney transplant patient who presented with a diffuse skin rash whose diagnosis initially was delayed and misdiagnosed. Subsequent skin biopsy led to an accurate diagnosis and complete recovery with definitive treatment.

CASE PRESENTATION

The patient is a 53-year-old female with end stage kidney disease (ESKD) due to uncontrolled hypertension who had a deceased donor kidney transplant (DDKT) in 2007. She received a second DDKT in March 2023 at our hospital. The day before her second kidney transplant, her serum creatinine was 6.4 mg/dL, and her estimated glomerular filtration rate (eGFR) was 8.6 mL/min/1.73 m². One month post-transplant, her serum creatinine was 1.2 mg/dL, and her eGFR was 57 ml/min/1.73 m². Induction immunosuppression included antithymocyte globulin 6 mg/kg, methylprednisolone taper, and mycophenolate 1000 mg twice daily. Her maintenance immunosuppression regimen consisted of extended-release tacrolimus 8 mg daily, prednisone 5 mg daily, and mycophenolate 360 mg twice daily, maintaining a tacrolimus level of 8-10 ng/ml. Approximately 5 months post-transplant, she was admitted to our hospital with fever, vomiting, diarrhea, a 15-pound weight loss, and thrombocytopenia. At the time of admission, her creatinine was 1.6 mg/dL, and her eGFR was 38.4 mL/min/1.73m².

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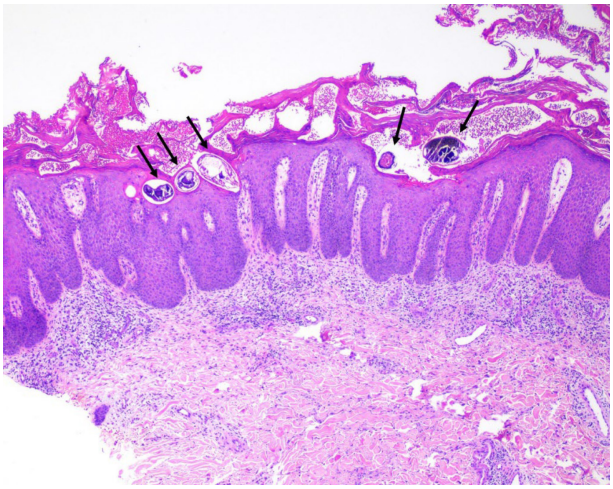
Figure 1. Diffuse Thick Hyperkeratotic Scaling on Trunk and Extremities

One month prior to this admission, the patient developed dryness of skin over the abdomen and thighs and previously had generalized itch, which had improved but had persistent thick, dry skin. She denied similar lesions in the past, and reported there was no history of eczema in her family. On dermatological examination, multiple lichenified hyperkeratotic plaques and diffuse xerosis were noted over the abdomen and upper thigh. The consulting dermatologist started her on triamcinolone ointment 0.1% twice a day and petroleum to the lesions for presumed lichen simplex chronicus. Regarding her fever, nausea, vomiting, and diarrhea, she initially was treated empirically with intravenous (IV) vancomycin and cefepime for sepsis. The infectious workup came back negative except for the respiratory pathogen panel for rhinovirus/enterovirus, and antibiotics were discontinued. She was managed conservatively and all symptoms—except the skin symptoms—resolved, and she was discharged with close outpatient clinic follow-up.

She was readmitted to our hospital about 2 weeks later due to a worsening rash across her body. She said she had been using triamcinolone ointment 0.1% twice a day and petrolatum ointment since discharge. She reported that the above medications helped, but for the past several days prior to this presentation, the lesions on her abdomen and upper thigh had worsened to large, crusted plaques and then spread to her bilateral legs, back, and buttock and were increasingly itchy and painful. She said her husband also had a similar rash on his back.

On dermatological examination, lichenified, cerebriform, verruciform papules and plaques appeared diffusely over the body and were especially hyperkeratotic over the abdomen and upper thighs. There was notable xerosis and lichenification to her hands, including interdigital web spacing, and no appreciable scabietic burrow was noted (Figure 1). Considering chronicity and recurrent lesions, we performed a skin punch biopsy. Histopathology revealed skin with epidermal acanthosis and spongiosis. There were hyperkeratosis and parakeratosis noted in the epidermis and numerous scabietic mite organisms within the corneal layer. The dermis displayed a mixed inflammatory infiltrate (Figure 2).

Figure 2. Skin Biopsy Showing Epidermal Acanthosis with Abundant Hyperkeratosis and Multiple Scabies Mites in the Stratum Corneum (arrows); Mixed Dermal Inflammatory Infiltrate (H&E, 40×)

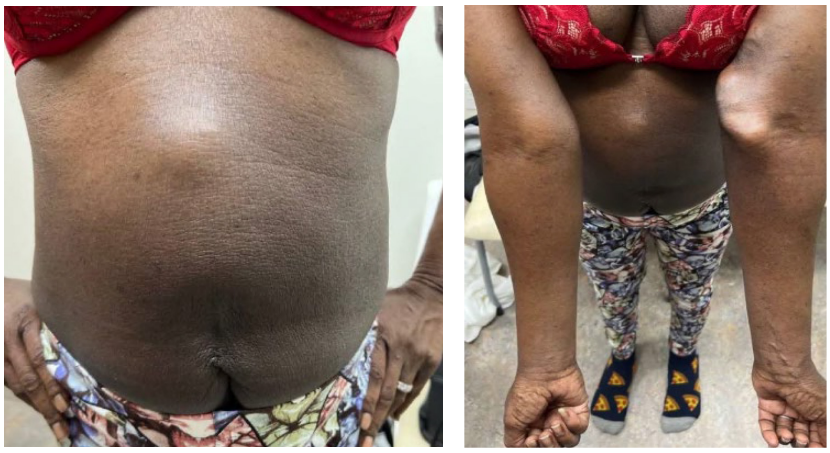


The patient was treated immediately with ivermectin by mouth 200 mcg/kg for 7 days on nonconsecutive days (days 1, 2, 8, 9, 15, 22, 29) and topical permethrin 5% applied to the entire body for 7 days, then twice weekly until symptoms resolved. Her immunosuppressive medications (mycophenolate, tacrolimus extended release, prednisone) continued during hos-

pitalization. She reported a significant improvement in skin scaling, itchiness, and pain with the initiation of ivermectin and permethrin ointment application, and she was discharged after about 5 days with outpatient dermatology clinic follow-up. It was recommended that all household contacts also get treatment with 2 doses of ivermectin 200 mcg/kg 1 week apart and 2 doses of permethrin 5% applied to the full body 14 days apart. Her family members were treated after her hospital discharge, and everyone was reported clearing.

Upon follow-up at the dermatology clinic 2 weeks later, the patient's skin lesions, itchiness, and pain were resolved after 4 doses of 13.5 mg ivermectin. Crusted whitish cerebriform plaques were resolved completely and only a hyperpigmented lesion remained (Figure 3). It was recommended that she complete a 7-day course of ivermectin to prevent a recurrence.

Figure 3. Post-treatment Resolution of Scaly Plaques with Normal Appearing Skin



DISCUSSION

Norwegian or crusted scabies is an uncommon and highly contagious infestation caused by *Sarcoptes scabiei* var. *hominis*.[1] It was first described by Danielssen and Boeck as an atypical skin condition in a population of leprosy patients in Norway in 1848 and is is characterized by hyperkeratosis and crusting of the skin attributed to the immune system's inability to control mite proliferation. Crusted scabies typically develops in patients with compromised T-cell immune response, diminished cutaneous sensation, and a reduced ability to mechanically remove the mites. It occurs with increased frequency among patients on immunosuppressive medications, leukemia, HIV infection, Down syndrome, lepromatous leprosy, malnourishment, and diabetes, and some studies have shown a potential connection between scabies and genetic factors (HLA 11).[1]

Recent studies have shown that crusted scabies patients display a nonprotective T helper 2 (TH2) response. This response is marked by increased production of interleukin (IL)-4, IL-5, and IL-13, along with reduced levels of interferon-c (IFNc) and a diminished T helper 1 (TH1) response. A predominant presence of infiltrating CD8+ T lymphocytes in the dermis has been noted, with minimal helper T lymphocytes (CD4+) and an absence of any B cells. The imbalance in cytotoxic T cells can intensify the dermis of crusted scabies lesional skin by affecting the inflammatory response. When combined with a low B cell count, this condition can result in weakened immune systems incapable of providing effective clearance of parasite.[4,5]

Clinical presentation of crusted scabies varies from patient to patient depending on the level of immunosuppression. Crusted scabies can mimic a variety of conditions and commonly is misdiagnosed as other dermatological conditions, such as psoriasis and lichen simplex chronicus,[3] which can be primary (chronic itching without an identifiable cause) or secondary (due to conditions like chronic eczematous dermatitis). Primary lichen simplex chronicus shows minimal evidence on biopsy, while secondary lichen simplex chronicus causes spongiotic changes in the epidermis and an inflammatory infiltrate with eosinophils. Fungal infections (dermatophytosis) can present with itchy, scaly, ring-like lesions that can sometimes coexist with crusted scabies. This coexistence is due to the overlapping symptoms and the immunocompromised state of affected individuals, making differential diagnosis essential for proper treatment. Patients often are treated initially with topical steroids, which exacerbates their condition further, as was seen in our patient.[3]

This case emphasizes the importance of avoiding pattern recognition bias when addressing skin diseases. An initial oversight in diagnosis extended and complicated the progression of the disease in our patient. Unlike classical scabies, crusted scabies often presents with less pruritic eruptions, and the typical signs of erythematous papules and burrows may be limited, absent, or concealed by the thick crust.

In immunosuppressed individuals, maintaining a high index of suspicion is crucial when dealing with unexplained chronic skin lesions that are itchy and painful as these cases may have atypical presentations.[2] Given the rising use of immunosuppressive medications and the longer life expectancy of immunocompromised patients, an increase in the occurrence of crusted scabies infestations can be anticipated. Therefore, it is important to include scabies in the differential diagnosis of refractory pruritus—even when the presentation is not typical.[6] Early diagnosis of crusted scabies is essential due to its association with heightened morbidity and

mortality. Misdiagnosis can lead to complications such as skin infections, with the fissures associated with crusted scabies being particularly susceptible to bacteremic superinfections, most commonly *S aureus* bacteremia. In cases of crusted scabies, a reported 30-day mortality rate is 16%.[7]

A retrospective review of over 200 cases of crusted scabies in a single hospital showed that 11% developed a superinfection with *S aureus* bacteremia, with a 7% mortality rate within 30 days. In the past 7 years, crusted scabies has had a high mortality rate of 50%, attributed primarily to sepsis or secondary infections.[1,8,9]

The diagnosis of crusted scabies relies on a combination of clinical findings and rapid bedside testing involving the microscopic examination of the scabies mites, eggs, or feces obtained from the skin scrapings of affected individuals. Additional novel methods include video dermatoscopy, epiluminescence microscopy, and polymerase chain reaction testing. When the diagnosis is unexpected, confirmation has been achieved through a skin punch biopsy, revealing mites burrowing in the stratum corneum, which was seen in our patient.[10,11]

Managing crusted scabies can be challenging in certain cases due to factors such as immunocompromised status, diverse skin lesions, numerous hyperkeratotic lesions housing mites, and ineffective penetration of topical agents due to thick crusts. Therapy failure and recurrence are common.[12] Therefore, the recommended approach involves a prolonged treatment with systemic scabicides. The most common treatment for crusted scabies is a single or recurrent dose of ivermectin (oral), adjusted based on the case severity. In our patient, we used both systemic and topical scabicide, which provided a complete response and prevented secondary infections.[1,3,13,14]

Certain literature reviews have highlighted cases in which treating with crusted scabies solely with topical scabies lead to fissures and an inability to tolerate the treatment. Additionally, some cases treated with 2 doses of ivermectin reported recurrence of crusted scabies.[9,12,15] The treatment goal involves eliminating mites, managing symptoms, and preventing secondary infection. The topical scabicides used for classical scabies (sulfur compounds, benzyl benzoate, crotamiton, lindane, malathion, permethrin) also are effective in treating crusted scabies. Typically, repeated applications are necessary, and the clearance process is slower compared to ordinary scabies. Topical permethrin, a synthetic pyrethroid formulation in a 5% cream, is currently the preferred topical scabicide agent used in combination with oral ivermectin. The therapy may be effective with a single dose of a 200 µg/kg, but multiple doses typically are needed for a complete cure. Permethrin is considered safe for pregnant and lactating women and can be used in infants 2 months of age or older.

Anticipating the risk of bacterial colonization and septicemia in all patients is crucial, and any secondary infections should be aggressively treated with broad-spectrum antibiotics. Given the risk of contagion – especially via bedding and clothing – it is advisable for staff to refrain from skin-to-skin contact, use gloves and gowns, and thoroughly launder the patient's clothes and towels. Prophylactic treatment for contacts may extend to the entire institution or include visitors and family members.[9,12,15]

Ivermectin, a semisynthetic anti-helminthic agent derived from Streptomyces avirmitilis, acts as an effective oral scabicide by inhibiting the gamma amino benzoic acid (GABA). However, it should be avoided in pregnant women and children weighing less than 15 kg. The use of keratolytic agents such as 5% to 10% salicylic acid and 40% urea are essential for crust removal, reducing mites' numbers, and enhancing the efficacy of a topical scabicide.[6,14,15]Environmental decontamination also is necessary in the treatment of crusted scabies to prevent recurrence.[1,12]

CONCLUSIONS

Transplant recipients are at an increased risk of severe parasitic infections such as crusted scabies due to drug-induced impairment of their cell-mediated immune response. Our patient, who received high-dose antithymocyte globulin, mycophenolate, and methylprednisolone as induction immunosuppression, was particularly vulnerable. Maintaining a high index of suspicion for crusted scabies as a differential diagnosis in transplant kidney patients is extremely important. Early histological diagnosis of crusted scabies is essential to prevent delayed or missed diagnosis and avoid unnecessary serious complications. The combination of an oral ivermectin and topical permethrin regimen resulted in excellent clinical outcomes in our patient and is recommended as the standard treatment.

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