

# A Rare Case of Cutaneous *Trichophyton verrucosum* of the Forearm in a 51-Year-Old Cattle Farmer

Alissa Guebeli, MD,\*§ Philipp Honigmann, MD,\*§|| Kirsten Mertz, MD,† Niels Willi, MD,† Georg Julian Claas, MD,‡ Marco Keller, MD\*§

*Trichophyton verrucosum* is a pathogen causing superficial mycoses in cattle worldwide and is one of the few zoophilic dermatophytes. Farmers and veterinarians are at a higher risk for infection owing to frequent direct animal contact. An increase in cases among humans has been observed in the past few years. We report a rare case of *T verrucosum* of the forearm in a 51-year-old cattle farmer, who after initial treatment with antibiotics and surgery, and in whom diagnosis was delayed, was finally successfully treated with terbinafine and itraconazole. (*J Hand Surg Am.* 2021;46(12):1128.e1-e4. Copyright © 2021 by the American Society for Surgery of the Hand. All rights reserved.)

**Key words** Forearm, skin, *Trichophyton verrucosum*, zoonosis.



**D**ERMATOPHYTES HAVE THE ABILITY TO invade and spread in keratin-rich tissue such as hair, nails, and skin. There are 3 known groups of dermatophytes: anthropophilic (human host and human-to-human transmission), zoophilic (animal host and animal-to-human transmission) and geophilic (human or animal host and infection through spores from soil).<sup>1,2</sup> *Trichophyton verrucosum* is a zoophilic dermatophyte found mainly in cattle. Rarely, it can also affect other livestock such as horses, sheep, pigs, and smaller animals such as cats and dogs and cause superficial mycoses (ringworm disease). The infection is often asymptomatic among

animal hosts, but it usually causes highly inflammatory lesions in humans.<sup>3</sup> The fungus can spread to humans through direct contact, where it usually causes ring-like lesions on the exposed skin.<sup>2</sup>

Risk factors for a dermatophyte infection are immunosuppression, the use of broad-spectrum antibiotics, concomitant chronic diseases, and socioeconomic and lifestyle factors.<sup>1</sup>

Because of effective livestock vaccination in the past, the infection rate in Central and Northern Europe is low compared with Southern Europe, the Middle East, and China.<sup>4</sup> In Switzerland, approximately 1% of dermatophytoses are caused by *T verrucosum*.<sup>5</sup> Owing to the clinical appearance, it is often initially misdiagnosed and treated as a bacterial infection.<sup>4</sup>

Farmers and veterinarians are at a higher risk for infection because of frequent direct animal contact. An increase in cases among humans has been observed in the past few years. Possible reasons are the decrease in livestock vaccination for financial reasons and the increasing number of outdoor breeding farms.<sup>2,6</sup>

From the \*Department of Hand Surgery, the †Institute of Pathology, and the ‡Institute of Infectiology, Kantonsspital Baselland, Liestal; and the §Medical Additive Manufacturing Research Lab, Department of Biomedical Engineering, University of Basel, Allschwil, Switzerland; and the ||Department of Biomedical Engineering and Physics, University of Amsterdam, Amsterdam, The Netherlands.

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**Corresponding author:** Marco Keller, MD, Department of Hand Surgery, Kantonsspital Baselland, Rheinstrasse 26, CH-4410 Liestal, Switzerland; e-mail: [marco.keller@ksbl.ch](mailto:marco.keller@ksbl.ch).

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## CASE PRESENTATION

A 51-year-old cattle farmer presented to his primary care physician (PCP) with erythema and fluctuating



**FIGURE 1:** Primary lesion with 3 satellite lesions at first presentation in the emergency unit.



**FIGURE 2:** At 10 days after surgery, a new satellite lesion appeared proximally.

swelling on the dorsal aspect of the left distal forearm. He reported that the skin lesion had appeared a week previously and he was unable to rule out a possible insect bite in the region. He had no history of immunodeficiency or other skin diseases. According to him, his cattle showed no skin abnormalities. The PCP suspected an infected insect bite and incised the swelling, followed by empiric antibiotic treatment, first with oral amoxicillin–clavulanic acid and then 2 days later with oral ciprofloxacin, owing to the persistence of symptoms. Two weeks after the first appearance of the symptoms, the patient presented to the emergency department with progression of the swelling, with an increase in the size of the primary lesion, and 3 satellite lesions in the surrounding area (Fig. 1). In addition, he reported an itching sensation.

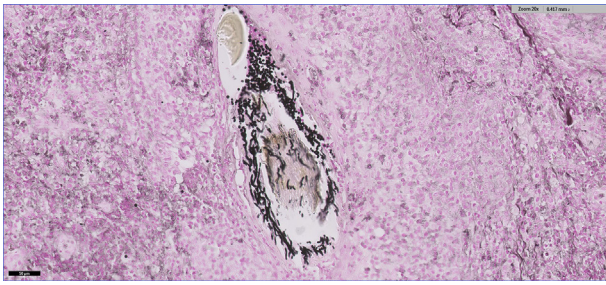
The patient showed no systemic signs of infection; leukocyte and C-reactive protein levels were not elevated. We excised the lesions and sent biopsies for histological and microbiological examination. During surgery, we found several small suppurative foci, which were also removed. On the recommendation of our infectious disease consultant, antibiotic treatment was paused. The microbiology results were negative

for bacteria, yeast, nocardia, mold, and actinomyces. In addition, we sent samples to a specialized laboratory for further analysis, in which infection with atypical mycobacteria and *Francisella tularensis* was excluded. The polymerase chain reaction for herpes simplex virus 1 and 2 and *Paravaccinia* virus were also negative. Ten days after surgery, the primary lesion showed prolonged wound healing and a new lesion appeared proximally (Fig. 2). The histopathological analysis suggested a deep mycosis with folliculitis (Fig. 3).

Finally, an additional analysis by a panfungal polymerase chain reaction identified *T verrucosum* 2 weeks after surgery. We initiated treatment with oral terbinafine 250 mg once a day, which led to continuous regression of the skin lesions.

Because of a drug-induced exanthema 2 weeks into terbinafine intake, we continued with oral itraconazole 200 mg once a day. Eight weeks after surgical intervention and 5 weeks after the initiation of antimycotic treatment, the patient showed complete wound healing with slightly hypertrophic scarring (Fig. 4).

An examination of the patient's cattle by the local veterinarian showed no cases of *T verrucosum* among the animals.



**FIGURE 3:** Histological image (Grocott stain) of a hair follicle surrounded by hyphae and spores of *Trichophyton verrucosum*.

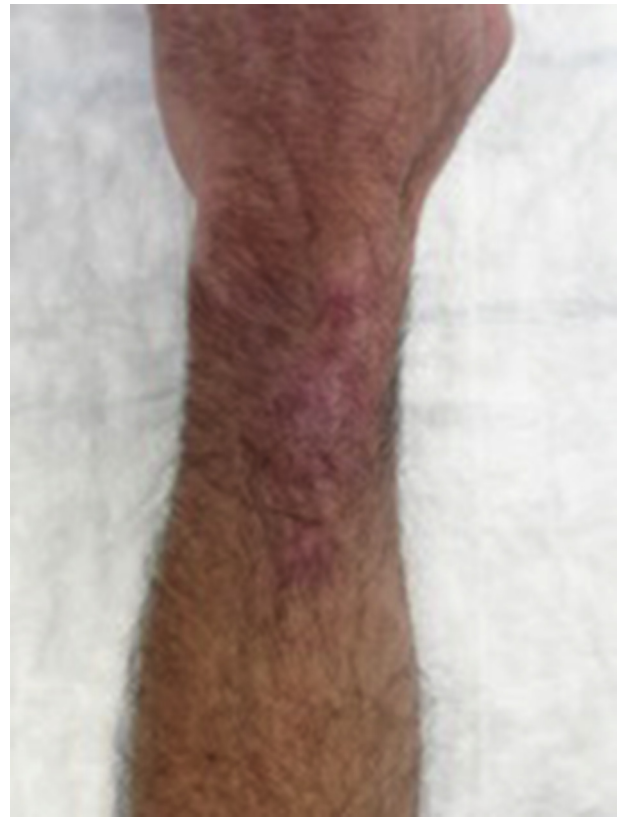
## DISCUSSION

Up to 25% of the global population has a superficial fungal infection.<sup>7</sup> A study of the incidence of *T verrucosum* infection in France showed values comparable to those of the incidence in Switzerland (1.53% of dermatophyte infections caused by *T verrucosum* over a 12-year period).<sup>5,8</sup> Overall, past studies showed a lower isolation frequency of *T verrucosum* in more developed countries.<sup>1,8</sup>

In the current case, the patient first consulted his PCP. He was initially misdiagnosed and treated with antibiotics. Because of the progression of the lesions, he was referred to our emergency unit, where a cutaneous, possibly bacterial infection of the forearm was suspected, and the hand surgery specialist was involved. In other published case reports and studies, the initial presentation of the patients was rarely directly to a dermatology specialist, but usually to a PCP.<sup>4,9</sup> This may be because patients affected by *T verrucosum* are mainly farmers in rural regions. Owing to the nonspecific clinical appearance of the lesions and insufficient awareness among PCPs, initial misdiagnosis and delay in making the correct diagnosis are common. Because *T verrucosum* in humans is rare, it is often initially misinterpreted as eczema, herpes, or bacterial infection<sup>10</sup>; the typical ring-like lesions can also indicate a *Candida*, *Epi-dermophyton*, microphytic, or sporotrichosis infection.<sup>11</sup>

The patient in this report was a cattle farmer with daily animal contact. In other reports, patients had regular animal contact with cattle,<sup>4,8</sup> goats, lambs and sheep,<sup>9</sup> llamas,<sup>6</sup> pigs, and pets.<sup>12,13</sup> Most patients were either veterinarians or part of a family of livestock farmers.<sup>6,9,12</sup> In one case report, there was a suspected transmission from human to animal, because the affected llamas had not had contact with other animals.<sup>6</sup>

In a study that included 41 patients with *T verrucosum* infection, nearly half of patients acquired the



**FIGURE 4:** Complete wound healing 7 weeks after surgery and 5 weeks after the initiation of antimycotic treatment.

infection through indirect exposure to cattle, which suggests contamination with spores in the soil.<sup>8</sup> This mechanism of transmission may have occurred in the current patient, because a local veterinarian had examined the farmer's cattle and found no sign of dermatophyte infection among the animals.

This patient had no concomitant diseases or previous immunosuppressive or antibiotic therapy and showed normal blood values throughout treatment. Other than regular animal contact, he had no risk factors for dermatophyte infection.<sup>1</sup> The lesions appeared on the lower forearm, which is a common site for dermatophyte lesions in adults.<sup>14</sup> The affected skin region in other studies was mostly the torso,<sup>13</sup> upper limbs,<sup>4,9</sup> lower limbs,<sup>12,13</sup> nails,<sup>6</sup> scalp, and face.<sup>4,12,13</sup>

In this case, the patient was initially incorrectly treated with antibiotics. In other cases in the literature, initial treatment was also antibiotic in nature, and in one paper, a case of kerion (highly inflammatory swelling in *Tinea capitis*) was falsely excised, which led to delayed wound healing.<sup>12,13</sup> Suspecting an ascending lesion, we incised the skin, and upon discovery of small intradermal abscesses, the lesion was completely excised. Because the sample did not provide evidence of bacterial growth, a different

pathogen was suspected as the cause of pus formation. Antibiotic treatment was stopped immediately while definitive verification of a pathogen was awaited. Nevertheless, an incision and even excision of the lesion probably would not have been necessary, and diagnosis might have been possible by marginal sampling of tissue. The presence of pus led to a clinical misdiagnosis.

The recommended treatment of *Trichophyton* infections in uncomplicated cases is local application of antifungal cream or lotion of tolnaftate, miconazole, or ciclopirox. More widespread lesions require systemic treatment with oral griseofulvin, ketoconazole, fluconazole, terbinafine, or itraconazole.<sup>4,6,11</sup> Terbinafine has proved to be the most effective drug with the lowest minimum inhibitory concentration.<sup>15</sup>

The most common pathogen-specific treatment in other case reports was also systemic terbinafine or itraconazole, but unlike the current patient, who was treated for more than 6 weeks, the usual duration of treatment was 1 month.<sup>4,6,9</sup> A pregnant patient was treated solely with local ciclopirox cream.<sup>13</sup> In the patient in the current report, treatment with terbinafine was guided by the clinical appearance.

When patients present with unfamiliar skin lesions, it is important to think of zoophilic dermatophytes as possible pathogens, especially among risk groups such as cattle farmers and veterinarians. Affected farmers should have a veterinarian examine their cattle for dermatophytosis.

Surgical intervention such as the incision or excision of lesions is indicated only when an ascending infection is suspected, because it can delay wound healing in case of dermatophytosis.

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