

How to diagnose and treat tinea

BRUCE TATE PhD, FACD

Tinea can present with a clear pattern of infection that can help to distinguish it from other skin conditions and prevent a misdiagnosis.

Case presentation

A 34-year-old man presented with an itchy rash on his feet of 14 months' duration. He was vague about the history but thought it had started on the sole of the left foot, then spread to the sole of the right foot a few months later. He had tried over-the-counter topical antifungal creams and a hydrocortisone cream with marginal benefit.

The rash had moved on to his right hand a few months before presentation. During this time the rash had spread over the feet to involve the whole of the soles (including the insteps) and part of the sides of the feet (Figures 1a and b). On the hand it had spread from the distal palm and fingers to also involve the sides and back of the hand (Figure 1c). The patient only sought treatment from his GP after the rash started on his hand.

The rash seemed to temporarily improve with the use of a betamethasone valerate cream. On referral of the patient to a dermatologist, the rash was quite active and itchy. The affected areas were inflamed and dry with thick scales in

places. There were a few vesicles, no pustules and no active edge to the rash on most sites, except a little on the dorsal hand. There was some mild distal yellowing and thickening of some of the toenails.

Diagnosis

A diagnosis of tinea was suggested by:

- the two feet, one hand pattern
- the gradual spread and expansion of the rash
- the lack of response to topical corticosteroids.

The lack of response to topical antifungal creams does not rule out dermatophyte infection – often prolonged oral treatment is needed to treat tinea on the feet and hands. Taking skin scrapings and nail clippings is mandatory in suspected cases of tinea because a positive test is useful in directing treatment if the first choice of treatment fails and it is not clinically possible to rule out alternative diagnoses.

In this patient, the diagnosis was confirmed with positive microscopy and, later, culture grew the anthropophilic dermatophyte, *Trichophyton rubrum*. The patient was not seen for follow up.

Treatment

While waiting for the microscopy and culture results, the patient was treated with griseofulvin 500 mg daily after the main meal because tinea was the most likely diagnosis. He was instructed to increase the dose to 1 g daily after two weeks if the drug was tolerated and stay at that dose for a total of 10 weeks.

Differential diagnoses

Dermatitis

There are a number of clinical patterns and causes of types of dermatitis, which include pompholyx, hyperkeratotic psoriasisiform, irritant contact dermatitis and allergic contact dermatitis. Dermatitis is usually symmetrical, so the clue to a diagnosis of tinea in the present case was the asymmetry of the rash (affecting only one hand). Eczema can also be asymmetrical, perhaps more so for contact forms but also in endogenous forms. Tinea can be symmetrical as seen on this patient's feet. If a diagnosis of tinea is ruled out and the dermatitis proves hard to treat, patch testing is recommended to rule out delayed hypersensitivity type allergic contact dermatitis (e.g. to new shoes or sock dye).

Psoriasis

Psoriasis is the other main differential diagnosis here. It can affect only hands or feet or both. Like dermatitis it is mostly, but not always, symmetrical. The plaques tend to be well demarcated but it may be confluent. Psoriasis varies from asymptomatic to itchy to painful (especially if fissured).

Keratodermas

Keratodermas are a complex group of both inherited disorders of keratinisation and acquired conditions. There are various patterns of thickened skin usually on a noninflamed base, although the base may be mildly red. Keratodermas are persistent and often hard to treat.

Comment

Tinea in its various guises is one of the most common types of inflammatory dermatoses. Although it is often easy to diagnose and treat, it is also one of the most commonly missed diagnoses. This is particularly so on the hands and/or feet where it is easily mistaken for various forms of dermatitis or psoriasis as discussed above. It is imperative that scrapings for fungal culture (and if necessary

Dr Tate is a Dermatologist in St Albans, Vic, and with the Skin and Cancer Foundation of Victoria.



Figures 1a to c. a (far left) and b (middle). Tinea pedis. c (above). Tinea manuum proven by positive cultures.

nail clippings) be taken from hand and foot rashes to rule out a diagnosis of tinea because a lack of response to topical antifungal creams is insufficient to rule it out.

The different dermatophyte fungi tend to cause different types of tinea and give clues to their source. *T. rubrum* is the most common cause of tinea on the broad surfaces of the hands and feet and also the groin, face and nails. It is also a common cause of tinea corporis. *Trichophyton mentagrophytes* var *interdigitale* is the usual cause of interdigital foot tinea but it sometimes causes tinea on other sites. Both are anthropophilic and can be transferred from human to human. Common presumed sources of infection are changing rooms, shared shoes (for example, bowling shoes) or human-to-human contact.

Less common causes of tinea are the zoophilic fungi, the most typical being *Microsporum canis* (usually caught from kittens and puppies but vets are also seeing it in adult animals), the usual cause of tinea capitis, and sometimes tinea corporis or tinea faciei. It can be passed to other children on close contact, but it is rare for adults to get tinea capitis from this cause. Uncommonly tinea corporis or tinea faciei is caused by *Trichophyton mentagrophytes* var *mentagrophytes*, usually

caught from other pets such as rabbits or guinea pigs but sometimes from native animals. African immigrants also commonly have tinea capitis caused by *Trichophyton violaceum* or *Trichophyton soudanense*.

Clinically, tinea pedis is usually found between the toes as a dry or more often macerated, sometimes irritated, rash. *T. rubrum* may be found between the toes but more often affects the broad surfaces and varies from mild to severe. Asymmetry is a helpful clue. The active edge is often present but can be subtle. It varies from dry to hyperkeratotic, vesicular or pustular depending on the strength of the immune reaction to the fungus, which unfortunately is not able to clear the infection. A strong immune response may set off dermatitis elsewhere, typically a vesicular, occasionally pustular pompholyx pattern on the feet or hands (this is also called an id reaction). Some people therefore have pompholyx on the hands and tinea pompholyx on the feet. As seen with this case, the hand rash may also be tinea, presumably spread by scratching the feet. Foot tinea may also be spread to the groin after scratching the feet or via clothing as they are put on. It is therefore useful to also check these sites for infection.

Tinea is easily confirmed by culture of skin scrapings, but this takes about a month to obtain a result. The laboratory can quickly determine the presence of fungal hyphae in the specimen with a 10% potassium hydroxide preparation, enhanced by other techniques. If a microscope is available the same procedure can be performed in the surgery.¹ Wood's light examination is only useful for diagnosing tinea capitis with *M. canis* often fluorescing a light yellow-green colour, whereas tinea corporis caused by the same fungus does not usually fluoresce. *Microsporum audouinii* is another dermatophyte that causes tinea capitis and fluoresces under Wood's light but it is rarely seen in Australia.

Therapy should be started immediately after the scrapings are taken – the choice of agent depends on the site of infection, the severity of infection and response to previous treatment. Although topical therapy may work well for less extensive tinea, it often fails to clear broad skin tinea on hands, feet and the scalp.

If topical therapy is chosen for broad skin sites, start with terbinafine cream (Lamisil Cream, SolvEasy Tinea Cream) twice daily for two to four weeks. Topical azole-type products can be used, such as clotrimazole, econazole (Dermazole,

Pevaryl Topicals), bifonazole (Canestan Once Daily Bifonazole Cream 1%, Mycospor), miconazole (Daktarin, Resolve products) or ketoconazole (Dakta GOLD, Nizoral Cream), although the failure rates of azole-type agents for dermatophyte fungi are higher than for terbinafine. These should be applied twice daily for four weeks (once daily for ketoconazole). Agents such as tolnaftate cream and powder (Mycil Healthy Feet, Tinaderm, Tinea-fax Cream and Powder) have a high failure rate although they are useful as dusting powders for shoes to reduce the risk of reinfection of tinea pedis.

For tinea pedis not settling with other topical agents, 6% benzoic acid and 3% salicylic acid (Gold Cross Whitfield's Ointment) can be useful. It is messy and should be applied twice a day for six weeks. Note topical agents such as nystatin have no action against dermatophyte fungi.

Oral therapy is preferred for more severe or extensive tinea or where adequate topical therapy has failed. The most commonly used agents are griseofulvin (Grisovin) and oral terbinafine (Lamisil tablets, Tamsil, Terbihexal, Zabel). Griseofulvin is a slower acting fungistatic agent effective against skin infections but is an

unreliable treatment for onychomycosis. Usually two to three months of treatment are required for non-nail tinea. It is more prone to cause side effects such as nausea and headaches, which is the most common reason for stopping the treatment.

Griseofulvin is taken once daily just after the main meal and a dose of 500 mg is usually sufficient but this can be increased, if tolerated, to 1 g daily. The dose in children is 10 mg/kg daily made up as a suspension by the pharmacist. It accesses the skin via the sweat so bathing needs to be timed appropriately. Other side effects include alcohol intolerance and occasionally nightmares or photosensitivity, although hepatotoxicity is rare. There have been reports of griseofulvin-induced lupus erythematosus, and acute intermittent porphyria can also flare. Men should be warned that griseofulvin affects spermatogenesis so they should not father children during treatment and within six months of stopping therapy. It may also interact with warfarin.

For dermatophyte onychomycosis, terbinafine 250 mg daily is more effective with a cure rate of about 70% after six months' therapy and is usually, but not always, effective for broad skin infections

after two to three months' therapy. It is only available on the PBS with an authority prescription for laboratory proven dermatophyte infection for three months, but another prescription can be obtained. The price of terbinafine has dropped, so it is more feasible to provide it as a private (non-PBS) prescription.

Side effects of terbinafine are uncommon but it occasionally causes an exanthem-like drug rash or more severe rashes such as Stevens Johnson syndrome, acute generalised exanthematous pustulosis, flare of psoriasis and the subacute form of lupus erythematosus. Systemic side effects such as hepatotoxicity and bone marrow failure are rare. It is not recommended during pregnancy or lactation and has not been approved for use in children under 15 years of age, although there is no data to suggest it cannot be used safely in children. Occasionally other oral agents such as itraconazole (Sporanox Capsules) 100 mg daily for two to four weeks or fluconazole 150 mg weekly for four weeks are used for dermatophyte onychomycosis. **MT**

References

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Further reading

1. University of Adelaide mycology online: <http://www.mycology.adelaide.edu.au> (accessed September 2008).
2. New Zealand Dermatological Society: <http://dermnetnz.org/fungal/tinea.html> (accessed September 2008).
3. Center for Food Security and Public Health Dermatophytosis fact sheet: <http://www.cfsph.iastate.edu/Factsheets/pdfs/dermatophytosis.pdf> (accessed September 2008).

COMPETING INTERESTS: None.