Superficial fungal infections

Roderick Hay

Abstract

Superficial fungal infections or mycoses are common treatable conditions seen in everyday clinical practice, although they can present differently in immunosuppressed patients. Dermatophyte or ringworm infections, superficial candidiasis of the mouth, skin or genital tract and infections caused by *Malassezia*, such as pityriasis versicolor, are the main conditions. Although they present with typical clinical changes, diagnosis can generally be confirmed by direct microscopy or culture of suitable samples. Treatment largely depends on the use of azole (imidazole/triazole) or allylamine antifungals, applied in short courses topically or for longer periods orally, depending on the site and severity of the infection.

Keywords Dermatophytosis; fungal infections; *Malassezia* infection; MRCP; superficial candidiasis; superficial mycoses

Key points

- Superficial fungal infection is the fourth most common cause of human disease
- Dermatophyte or ringworm infections respond to antifungals, but only oral agents are effective in scalp infection (tinea capitis)
- Fluconazole-resistant *Candida* species are increasingly found in vaginal candidiasis
- The yeast *Malassezia* is implicated in causing dandruff and seborrhoeic dermatitis
- Laboratory confirmation of infection is still dependent on microscopy and culture

Introduction

Superficial fungal infections include common skin diseases as well as rare infections confined to specific geographical areas or groups of patients.[1] Together, however, they are the fourth most common cause of human disease and the most common infection globally. The principal diseases are:

- dermatophytosis (ringworm − tinea capitis, tinea pedis)
- superficial candidiasis (cutaneous, oropharyngeal, vaginal)
- disease caused by *Malassezia* spp. (pityriasis versicolor, seborrhoeic dermatitis).

Dermatophytosis

Dermatophyte fungi are organisms that digest keratin. They belong to three principal genera − *Trichophyton*, *Microsporum* and *Epidermophyton*. They are also grouped according to their sources of infection: geophilic (soil), zoophilic (animals) and anthropophilic (humans). Transmission is indirect through desquamated epidermis or hairs, or direct through bodily contact.

Dermatophytosis (tinea) is an infection of skin and the keratinized structures (hair, nails) arising from it. In the skin, the archetypal lesion is annular with central healing (ringworm). Clinical descriptions are based on the site of infection. Tinea pedis is estimated to affect up to 15% of the healthy population, and fungal nail disease (onychomycosis, see *MEDICINE* 2017; **45:** 390−395) >15% depending on age.

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- Dermatophyte lesions can scale and itch. In tinea corporis, the lesion can be annular.
- In tinea pedis, skin erosions or blisters develop in the web spaces, and the soles can be covered with dry scales.[2]
- Lesions of tinea cruris in the groin have a prominent rim.
- Tinea capitis (scalp ringworm; Figures 1 and 2) is a disease of childhood presenting with alopecia and scaling on the scalp. Its incidence has increased in the UK, Europe and the USA because of the spread of anthropophilic species,[3] particularly *Trichophyton tonsurans*.
- In untreated or severely immunosuppressed individuals with AIDS, dermatophytosis can lead to widespread or atypical infections, as well as rapidly spreading white onychomycosis involving the whole nail plate.

Dermatophytosis is often confused with other common skin conditions forming rings (e.g. eczema, annular erythemas, granuloma annulare). Tinea capitis can also be difficult to recognize because the hair loss is often patchy and confined to small areas or single hairs. The diagnosis of dermatophytosis should be confirmed in the laboratory.

Superficial candidiasis

Superficial *Candida* infections are usually caused by *Candida albicans*. This organism is a common commensal in the mouth, vagina and gastrointestinal tract in healthy individuals. The prevalence of carriage is greater in hospitalized patients and those who are immunocompromised.

Oropharyngeal candidiasis (oral thrush): has typical symptoms and signs of soreness and white patches on an erythematous background (plaque type). An erythematous variety exists; this does not have plaques, but sore areas of erythema are typical. Acute or chronic infection can occur in immunocompromised individuals. Other predisposing factors include antibiotic therapy and dentures.

Vaginal candidiasis (vaginal thrush): is a common infection, with clinical appearances similar to those of oropharyngeal disease, plus discharge. Pruritus can also occur, and recurrent

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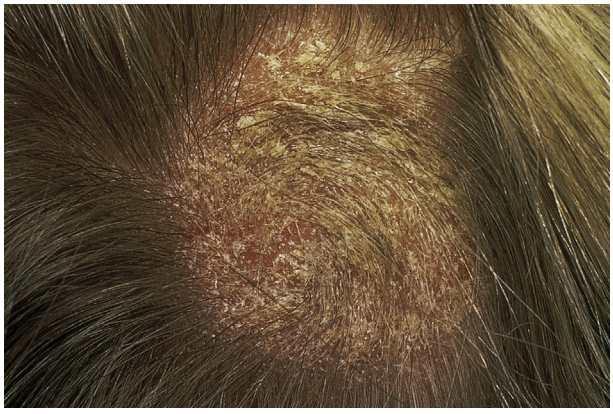

Figure 1 Inflammatory tinea capitis caused by *Microsporum canis* acquired from a cat.

Figure 2 Tinea capitis caused by an anthropophilic fungus (*Trichophyton tonsurans*). Signs such as scaling can be minimal.

episodes are common. Women with vaginal thrush seldom have underlying predisposing factors.

Candidiasis of the skin: is often confined to body folds, including the interdigital spaces of the hands or feet. Typically, small satellite pustules lie distal to the periphery of the rim of the rash. Chronic paronychia (nail fold infections) can be caused by *Candida* (Figure 3).

Malassezia infection

Malassezia spp. are common surface commensals of greasy skin (e.g. scalp, chest). They are associated with pityriasis versicolor, seborrhoeic dermatitis and folliculitis.[4] *Malassezia* infection can complicate chronic central venous cannulation, mainly in neonates, manifesting as pulmonary infiltrates on chest imaging.

Pityriasis versicolor: is a scaly, hypo- or hyperpigmented rash on the trunk (Figure 4). It is common in tropical regions and in patients who have recently taken a holiday in a sunny climate. The patches can resemble vitiligo, but the presence of scaling is typical.

Seborrhoeic dermatitis: is a common scaly condition affecting the face (including the nasolabial folds), the front of the chest and the scalp (dandruff). Severe seborrhoeic dermatitis is

Figure 3 Chronic *Candida* paronychia. In this patient, the infection is centred on the nail fold.

Figure 4 Pityriasis versicolor caused by *Malassezia*. Scaling can be difficult to see in such cases.

particularly common in patients with AIDS or chronic neurological conditions such as Parkinson's disease.

Malassezia folliculitis: is an itchy, follicular rash on the upper back and shoulders that can resemble acne.

Laboratory diagnosis

The key to diagnosis is the demonstration of the organisms in skin scales, hair or nails. Scrapings are taken with a scalpel or nail clippers. They are examined in potassium hydroxide or a fluorescent stain such as Calcofluor, and can be cultured on Sabouraud's medium. Skin scales, hair and nails can be sent to a laboratory folded in a card (transport packs are available). Material from mucosal surfaces is best sent on a moistened swab. Routine molecular diagnostic measures are not available.

Management

Topical antifungals (e.g. terbinafine, imidazoles such as clotrimazole; Table 1) are necessary for most circumscribed infections. Treatment lasts 1–4 weeks. Nail infections require systemic treatment with terbinafine 250 mg daily for 6 weeks to 3 months, or itraconazole 200 mg twice daily for 1 week every month for 3 months (pulsed therapy).

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