Superficial Dermatophyte/Tinea

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Overview

- Among the most common infectious diseases world-wide
- *Microsporum*, *Trichophyton* and *Epidermophyton*, the 'dermatophytes', comprise the three genera of fungi able to invade and thrive in keratinized tissue (hair, skin, and nails)
- Inflammation caused by dermatophyte invasion leads to considerable morbidity (pruritus, discomfort, and potentially secondary skin and soft-tissue infections)
- Regardless of causative species, dermtophytoses are named "tinea" followed by the Latin word for the affected site (e.g. tinea capitis, tinea corporis, tinea pedis)

Clinical Presentation

- Typically pruritic with varied appearance depending on causative organism and site infected
- **Tinea capitis** (scalp): mainly affects children with varying appearances
  - Mild, diffuse flaking
  - Black dot alopecia (broken-off hairs)
  - Circular alopecic patches with scale
  - Kerion (inflamed, boggy plaque)
  - Diffuse pustules
  - Tender occipital lymphadenopathy may occur and can be a useful clinical diagnostic clue
- **Tinea faciei** (face) & **barbae** (beard): disease of postpubertal boys & men
  - Appearance ranging from annular scaly patches to an erythematous pustular crusted eruption with potential kerion formation
- **Tinea corporis** (body, extremities to dorsal hands/feet): most common in children & young adults
  - Asymmetrically distributed annular, expanding, scaly erythematous patches (Fig. 37.1a)
  - Perifollicular papulopustules (**Majocchi's granuloma**) (Fig. 37.1b)
  - Vesicles and concentric rings (**tinea imbricata**) may be seen
- **Tinea cruris** (groin): "Jock itch", typically seen in adult men
  - Similar in presentation to tinea corporis, but scaling may be masked due to moisture.

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- **Tinea manuum** (hand): most commonly a unilateral palmar infection
  - Typically seen on the dominant hand and seen in conjunction with tinea pedis ("one hand, two foot syndrome")
  - Palms appear xerotic with dry scale accentuating the creases
- **Tinea pedis** (foot): "Athlete's foot", typically affects adults, especially those wearing occlusive footwear (Fig. 37.1a)
  - Most commonly appears as maceration, scaling and fissures of the lateral interdigital webspaces extending medially as disease progresses
  - Moccasin (dry, diffuse scaling, erythema and plantar hyperkeratosis with fissures)
  - Inflammatory (vesicles and bullae of plantar insteps) and ulcerative patterns may be observed
- **Tinea unguium** (nails): onychomycosis caused by a dermatophyte, affects adult men more frequently than women
  - Toe nails significantly more frequently affected than finger nails (Fig. 37.1a)
  - 4 patterns: distal/lateral subungual (most common), proximal subungual (immunocompromised host), superficial white, and total dystrophic
  - Nail plate may be yellow or white, brittle or thickened with onycholysis, subungual hyperkeratosis, and ridging
- **Tinea incognito**: dermatophyte infection inadvertently treated with topical corticosteroids may lose the classic morphology complicating the clinical picture; face and trunk are common sites.
- **Majocchi granuloma:** when superficial dermatophyte infections are unrecognized and treated with topical steroids, local immunosuppression can allow the dermatophyte to penetrate deeper into the dermis,
  - Papules, pustules, and nodules
  - Often requires systemic medication to eradicate as not responsive to topical therapy (see below)
- **Dermatophytid** ("id") reaction: a diffuse, auto-eczematization reaction classically incited by inflammatory tinea pedis, but now known to occur with flares of other dermatididies; this manifests with an exuberant, often monomorphic, papular eczematous eruption which can be widespread due to circulating systemic inflammatory mediators in response to a localized, severe tinea infection

Histopathology

- Biopsy may be avoided if KOH exam/culture is positive (Fig. 37.2a)
- Histopathology demonstrating the characteristic organisms is the definitive diagnosis (Fig. 37.2b)
- Neutrophils within the stratum corneum are frequently seen; high power H&E examination of the narrow, compact eosinophilic layer of stratum corneum just above the granular layer may reveal round hyphae cut on end
- Periodic acid-Schiff (PAS) and silver stains (Grocott-methamine silver, GMS) highlight fungi

Differential Diagnosis

Based on site/pattern, the differential diagnosis may change; clinical morphology of annular erythematous patches with scale is suspicious for tinea, and generally KOH scraping demonstrating organisms is the preferred method to confirm dermatophyte infection in most cases

- Tinea capitis: Langerhans cell histiocytosis, folliculitis decalvans, central centrifugal cicatricial alopecia, alopecia areata
- Tinea corporis: Mycosis fungoides, secondary syphilis, erythema annulare centrifugum, cutaneous lupus erythematous (subacute and chronic), dermatitis (atopic, nummular, stasis, contact, seborrheic, dyshidrotic), psoriasis, lichen planus
- Tinea cruris: irritant dermatitis, Langerhans cell histiocytosis, Hailey-Hailey disease, candida infection, inverse psoriasis
- Tinea pedis: psoriasis, dermatitis
- Tinea unguium/Onychomycosis: pachyonychia congenita, trauma, Darier disease

Work-Up

- Tinea cruris, pedis, unguium and manuum frequently occur in conjunction so a total skin exam must be performed
- Potassium hydroxide (KOH) preparation: branching hyphae extending across keratinocytes (Fig. 37.2a)
- Chlorazol black E stain highlights fungal elements in KOH preps
- Wood lamp exam of tinea capitis will fluoresce yellow (*Microsporum* spp.) or blue-white (*Trichophyton schoenleinii*)
- Nail clipping with PAS stain for histopathologic examination or use of Calcofluor white
- Briskly brushing a disposable toothbrush over affected scalp and submitting the brush in a sterile container (urine cup) is an effective collection method for culture

Treatment

- Treatment is important as an active dermatophyte infection can lead to skin barrier dysfunction thus predisposing to bacterial superinfection and cellulitis or, if immunocompromised, systemic infections
- Simple tinea pedis/manuum/cruris/corporis may be treated topically
  - No difference in effectiveness between azoles and allylamines (terbinafine, naftifine)
  - Apply twice daily for 2–6 weeks, continuing for 2 weeks after clinical cure
  - With significant inflammation a low to moderate-potency corticosteroid may be added to aid clinical cure
- Dermatophytoses involving an extensive surface area, hairy skin, or with extensive inflammation will require systemic therapy for 2–4 weeks
- Tinea capitis must be treated systemically until culture is negative
  - Griseofulvin is more effective against *Microsporum* spp. infections
  - Terbinafine is more effective against *T. tonsurans,* the most common cause of tinea capitis in the US
  - Kerions may require an anti-inflammatory agent (prednisone) to prevent scarring and permanent alopecia
- Tinea unguium, aside from superficial white onychomycosis, necessitates systemic therapy. Duration depends upon finger vs. toe involvement and the agent used (terbinafine, fluconazole, griseofulvin, itraconazole)
- Majocchi granuloma may require systemic antifungal therapy
- Controlling predisposing factors helps prevent repeat infection (breathable shoes/socks, frequent replacement of footwear, avoiding exposures/trauma, treating underlying disease)

Suggested Readings

1. van Zuuren EJ, Fedorowicz Z, El-Gohary M. Evidence-based topical treatments for tinea cruris and tinea corporis: a summary of a Cochrane systematic review. Br J Dermatol. 2015;172(3):616–41.
2. Moriarty B, Hay R, Morris-Jones R. The diagnosis and management of tinea. BMJ. 2012;345:e4380.

Fig. 37.1 Tinea skin infections/dermatophytosis. (**a**) Yellow, dystrophic nails (due to onychomycosis, or fungal infection of the nail plate) and erythematous, scaling, annular patches with serpiginous borders. (**b**) Inflammatory erythematous serpiginous plaques of superficial tinea corporis with indurated papules with rare pustules of Majocchi granuloma (deeper dermatophyte infection extending down hair follicles due to inappropriate treatment with topical corticosteroids).

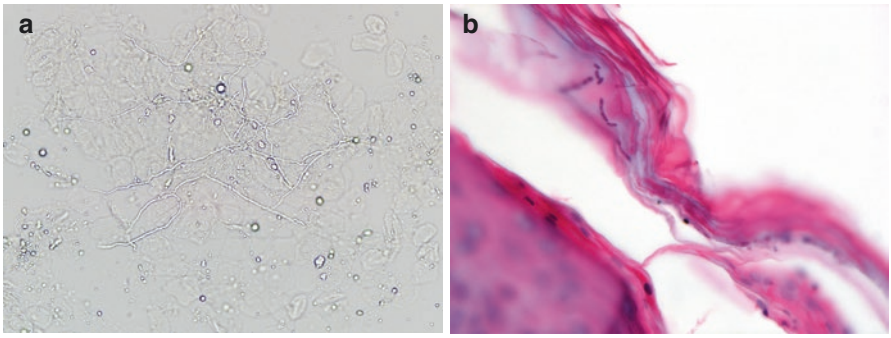

Fig. 37.2 Tinea corporis (KOH, *H&E 40*×). (**a**) Potassium hydroxide preparation demonstrates refractile, often branching hyphae. (**b**) On histopathology, collections of neutrophils with parakeratosis within the stratum can be a diagnostic clue. A superficial lymphocytic and neutrophilic infiltrate in the dermis with exocytosis can also be seen. Hyphae within the stratum corneum on H&E or highlighted on PAS stain is diagnostic.