



**Paulo Morais**  
Ligia Peralta

# Smelly foot rash

**Keywords:** skin diseases, infectious

## Case study

A previously healthy Caucasian girl, 6 years of age, presented with pruritic rash on both heels of 6 months duration. The lesions appeared as multiple depressions 1–2 mm in diameter that progressively increased in size. There was no history of trauma or insect bite. She reported local pain when walking, worse with moisture and wearing sneakers.

On examination, multiple small crater-like depressions were present, some coalescing into a larger lesion on both heels (*Figure 1*). There was an unpleasant 'cheesy' odour and a moist appearance. Wood lamp examination and potassium hydroxide testing for fungal hyphae were negative.

### Question 1

What is the diagnosis?

### Question 2

What causes this condition?

### Question 3

How would you confirm the diagnosis?

### Question 4

What are the differential diagnoses?

### Question 5

What is your management strategy?

### Answer 1

Based on the typical clinical picture and the negative ancillary tests, the diagnosis of pitted keratolysis (PK) is likely. Pitted keratolysis is an acquired, chronic, mostly asymptomatic bacterial infection of the skin, common among patients who continuously wear moist socks, have frequent contact with water, or wear



Figure 1. Heel of patient

protective/occluded footwear for prolonged periods.<sup>1–4</sup>

### Answer 2

Pitted keratolysis is frequently seen during summer and rainy seasons, particularly in tropical regions, although it occurs worldwide.<sup>1,3,4</sup> It is caused by *Kytococcus sedentarius*, *Dermatophilus congolensis*, or species of *Corynebacterium*, *Actinomyces* or *Streptomyces*.<sup>1–4</sup> Under favourable conditions (ie. hyperhidrosis, prolonged occlusion and increased skin surface pH), these bacteria proliferate and produce proteinases that destroy the stratum corneum, creating pits. Sulphur containing compounds produced by the bacteria cause the characteristic malodor.

### Answer 3

Pitted keratolysis is usually a clinical diagnosis with typical hyperhidrosis, malodor (bromhidrosis) and occasionally, tenderness, itching and pain on walking.<sup>1–4</sup> Lesions consist of numerous small, superficial pits or craters (1–7 mm diameter) over the pressure bearing aspects of the plantar surface of the feet and, occasionally,

the palms of the hands.<sup>1,3,4</sup> The lesions may coalesce into large craters, rings of craters, or irregular erosions.

Dermatoscopy may reveal numerous black circles in a parallel pattern on the skin ridges caused by craters of the stratum corneum and pigment produced by coccoid organisms.<sup>5</sup>

Wood light examination is not always helpful, but may display coral red fluorescence. Skin biopsies are not required, as the diagnosis can be made clinically. However, shave biopsy with methenamine silver staining is more helpful than punch biopsy.<sup>3</sup>

As a triad of concurrent corynebacterial diseases (ie. erythrasma, trichomycosis axillaris, and PK) has been reported,<sup>6</sup> clinicians making a diagnosis of PK need to examine the patient for evidence of other corynebacterial infections. However, most cases are asymptomatic and go untreated.

#### Answer 4

The main differential diagnoses to be considered are tinea pedis and plantar warts. Rare differential diagnoses include palmoplantar punctate keratoderma, porokeratosis, the pits of basal cell naevus syndrome (Gorlin syndrome), arsenic keratosis, tungiasis, yaws, keratolysis exfoliativa, focal acral hyperkeratosis, and circumscribed acral hypokeratosis.<sup>1,3,4</sup>

#### Answer 5

Preventive measures include avoiding occlusive footwear, reducing foot friction with properly fitting footwear, using absorbent 100% cotton socks and washing these in hot water, washing feet with soap or antibacterial cleanser twice per day, and avoiding sharing footwear or towels.<sup>1-4</sup> In patients with associated hyperhidrosis the application of an antiperspirant (eg. 20% aluminum chloride solution) may be helpful.

Effective topical treatments include: erythromycin, clindamycin, fusidic acid, mupirocin, gentamycin, benzoyl peroxide, or the combination clindamycin 1% benzoyl peroxide 5% usually used to treat acne.<sup>1-4</sup> Oral erythromycin is another option. Successful treatment clears the lesions and odour in 3-4 weeks.<sup>1,4</sup> For resistant disease due to severe hyperhidrosis, botulinum toxin injections can be effective.<sup>7</sup>

#### Case follow up

Our patient was successfully treated by explanation of the preventive measures and fusidic acid cream and 20% aluminum chloride.

#### Authors

Paulo Morais MD, is a dermatology resident, Department of Dermatovenereology, Hospital S João, Porto, Portugal. paulomoraiscardoso@gmail.com

Ligia Peralta MD, is a pediatrics resident, Department of Pediatrics, Hospital Infante D Pedro, Aveiro, Portugal.

Conflict of interest: none declared.

#### References

1. Singh G, Naik CL. Pitted keratolysis. *Indian J Dermatol Venereol Leprol* 2005;71:213-5.
2. Kennedy W. Case of the month. Pitted keratolysis. *JAAPA* 2008;21:86.
3. García-Cuadros R, del Prado YF-N. Abanico clínico de la queratólisis punctata. *Dermatol Perú* 2006;16:233-8.
4. English JC. Pitted keratolysis. *eMedicine*. Available at <http://emedicine.medscape.com/article/1053078> [Accessed 14 August 2010].
5. Akay BN. Dermatoscopic findings of palmar pitted keratolysis due to battery heated hand warmer. *Ankara Üniv Tıp Fak Mecm* 2009;62:129-30.
6. Shelley WB, Shelley ED. Coexistent erythrasma, trichomycosis axillaris and pitted keratolysis: an overlooked corynebacterial triad. *J Am Acad Dermatol* 1982;7:75-7.
7. Tamura BM, Cucé LC, Souza RL, et al. Plantar hyperhidrosis and pitted keratolysis treated with botulinum toxin injection. *Dermatol Surg* 2004;30(12 Pt 2):1510-4.

correspondence [afp@racgp.org.au](mailto:afp@racgp.org.au)