

Is the hip prosthesis responsible for this rash?



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A 53-year-old man presented with a 3-week history of a slowly expanding pruritic rash over the right hip. The patient underwent right total hip arthroplasty 10 months prior, complicated by a joint infection requiring 2 incision and drainage procedures and antibiotic bead placement. He was treated with 6 weeks of intravenous rocephin then was transitioned to oral amoxicillin. The area was bandaged for many months. Medical history was significant for tinea pedis with onychomycosis. Physical examination found a 10-cm annular, erythematous patch with fine scaling accentuated at the border (Fig 1). Results of potassium hydroxide preparation are shown (Fig 2).

Photomicrograph courtesy of Joy King, MD, PhD; Department of Pathology,
University of Mississippi Medical Center.

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Funding sources: None.

Conflicts of interest: Dr Brodell discloses that clinical trials have been performed for Genentech and Janssen Biotech, Inc. Drs Reed and Mockbee have no conflicts of interest to declare.

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JAAD Case Reports 2018;4:1-3.

2352-5126

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<http://dx.doi.org/10.1016/j.jidcr.2016.11.011>

Question 1: What is the most likely diagnosis?

- A. Allergic contact dermatitis (ACD) to a topical product
- B. Allergic dermatitis related to a metal implant
- C. Irritant contact dermatitis (ICD)
- D. Superficial fungal infection
- E. Psoriasis vulgaris

Answers:

A. ACD to a topical product – Incorrect. ACD classically presents as a pruritic, well-demarcated erythematous patch, linear streak, or plaque with vesicles corresponding to the area of allergen contact. There was no history suggesting a topical contacted this site.

B. Allergic dermatitis related to a metal implant – Incorrect. *Systemic contact dermatitis* is the term used to describe a cutaneous reaction resulting from a systemic allergen exposure. Between 1% and 5% of patients receiving orthopedic metal implants have a cutaneous reaction caused by metal sensitivity, often overlying the prosthesis.¹ Rates of metal sensitivity are higher in failed implants.² Other diagnoses must be excluded before accepting this as the presumptive diagnosis.

C. ICD – Incorrect. ICD is the most common type of contact dermatitis and is the result of localized chemical irritation that is toxic to the skin. Clinically, it may mimic ACD but is usually accompanied by complaints of burning and stinging rather than pruritus. This lesion's defined border would be unusual in ICD.

D. Superficial fungal infection – Correct. Tinea corporis is a superficial dermatophyte infection involving the skin on the trunk or extremities and is typically limited to the stratum corneum. Classically, dermatophyte infections spread outward causing an annular lesion with central clearing and a moderate amount of scale as seen here. Diagnosis was confirmed by KOH preparation of scale scrapings, which showed hyphal elements.

E. Psoriasis vulgaris – Incorrect. Psoriasis is characterized by sharply demarcated plaques with thick white, micaceous scaling. It classically involves the scalp and extensor surfaces of adult patients. Koebnerization can initiate psoriasis, but this plaque is distant from the incision.³

Question 2: The KOH preparation reveals:

- A. Budding yeast

- B. Septate hyphae
- C. Cotton fibers from bandage
- D. Inflammatory cells
- E. Keratinocyte cell walls

Answers:

A. Budding yeast – Incorrect. *Candida* species infection may be confirmed by KOH preparation when oval budding yeast and pseudohyphae are identified, not the septate hyphae identified here. Cutaneous candida infections typically present with deeply erythematous patches and may also have erosions, pustules, or satellite lesions.

B. Septate hyphae – Correct. Septate hyphae on KOH preparation is consistent with a superficial cutaneous fungal, or dermatophyte, infection. *Trichophyton rubrum* is the most common cause of tinea corporis, a dermatophyte infection of the trunk or extremities. Infection may be acquired by direct contact with an infected individual, contact with fomites, or secondary spread from a distant site of infection, such as scalp or feet.

C. Cotton fibers from bandage – Incorrect. Cotton fibers may appear on any KOH preparation, especially if collected from an area that has been covered tightly with a bandage or other fabric. On microscopy, cotton fibers are large and stain much darker than the hyphae noted here.

D. Inflammatory cells – Incorrect. Inflammatory cells are small, round nucleated cells that may be seen on KOH. The background cells noted here are keratinocytes collected during the scraping.

E. Keratinocyte cell walls – Incorrect. Keratinocyte cell walls may overlap and be confused with hyphae when examining a KOH preparation. Focusing the slide up and down can help the examiner distinguish the true parallel walls and septa of hyphae from overlapping keratinocyte cell walls, which appear as a single line.

Question 3: What is the underlying pathophysiologic mechanism responsible for this condition?

- A. Irritant dermatitis
- B. Koebnerization
- C. Type I hypersensitivity reaction
- D. Type IV hypersensitivity reaction
- E. Translocation of infectious agent to warm, moist skin

Answers:

A. Irritant dermatitis – Incorrect. Irritant dermatitis is the result of direct contact of the skin with a toxic substance. This reaction is nonimmunologic and localized to the area of exposure.

B. Koebnerization – Incorrect. Koebnerization is a phenomenon in which a skin lesion is spread by trauma, such as scratching. This typically results in a linear pattern of spread.

C. Type I hypersensitivity reaction – Incorrect. Type I hypersensitivity reactions are caused by activation and degranulation of mast cells within tissues. Type I hypersensitivity reactions in the skin include angioedema and urticaria.

D. Type IV hypersensitivity reaction – Incorrect. Type IV hypersensitivity reactions are delayed-type reactions caused by T-cell activation after previous sensitization. ACD is a type IV hypersensitivity reaction in the skin.

E. Translocation of infectious agent to warm, moist skin – Correct. Dermatophytes infect only the upper layer of the skin, the stratum corneum. After inoculation from this patient's interdigital tinea or onychomycosis, these organisms would thrive in a warm moist environment underneath a bandage.

Abbreviations used:

ACD: allergic contact dermatitis

ICD: irritant contact dermatitis

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