



# Reverse Koebner phenomenon induced by the Mantoux test in erythrodermic psoriasis: A case report and literature review

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**Key words:** Mantoux test; protein purified derivative test; psoriasis; reverse Koebner phenomenon.

## INTRODUCTION

The Koebner phenomenon (KP) was first described in patients with psoriasis.<sup>1</sup> It was subsequently reported to occur with many dermatologic disorders.<sup>2</sup> However, reverse KP, defined as the disappearance of lesions of a particular dermatosis at the injury site, is a rare condition with only a few reported cases.<sup>3-6</sup>

The exact pathogenesis of KP and reverse KP are poorly understood.<sup>7,8</sup> KP is highly associated with active diseases; however, reverse KP is reported in individuals with more stable conditions.<sup>9</sup> The Mantoux test has reportedly induced KP in patients with psoriasis<sup>10</sup> or, even worse, has triggered the onset of psoriasis in some patients.<sup>11</sup> Nonetheless, it has never been reported to induce reverse KP. Therefore, we describe the first case report, to our knowledge, of reverse KP induced by the Mantoux test in a patient with erythrodermic psoriasis.

## CASE REPORT

A 34-year-old Saudi man (with skin phototype VI) with chronic plaque psoriasis for 10 years presented to the emergency department at King Saud University Medical City with generalized erythema for several months. He reported having felt multiple armpit and groin masses for several weeks. Therefore, the patient was admitted for further investigation, and the dermatology team was

### Abbreviation used:

KP: Koebner phenomenon

consulted the next day. The patient did not have other comorbidities. He also had no history of fever, anorexia, weight loss, night sweats, or other symptoms suggestive of malignancy or chronic infection. He was previously treated with methotrexate for 5 years, followed by anti-tumor necrosis factor- $\alpha$  agents (etanercept and adalimumab) for 4 years. He then began using cyclosporine, which was discontinued 2 months before presentation. At the time of admission, he was using only topical therapy (an emollient and topical corticosteroid).

During clinical examination, the patient had stable vital signs and had generalized scaly erythema covering more than 90% of his body surface area, sparing the face, palms, and soles (Fig 1, A and B). Physical examination found multiple rubbery, mobile, nontender, bilateral axillary, and inguinal lymph nodes. Nail examination found pitting and oil drop sign, whereas joint examination revealed normal findings. No lower limb edema was found, and the chest and abdominal examination findings were normal. Notably, there was an area of normal skin approximately 1 × 1 cm over the right volar forearm. The patient recently (1 month before

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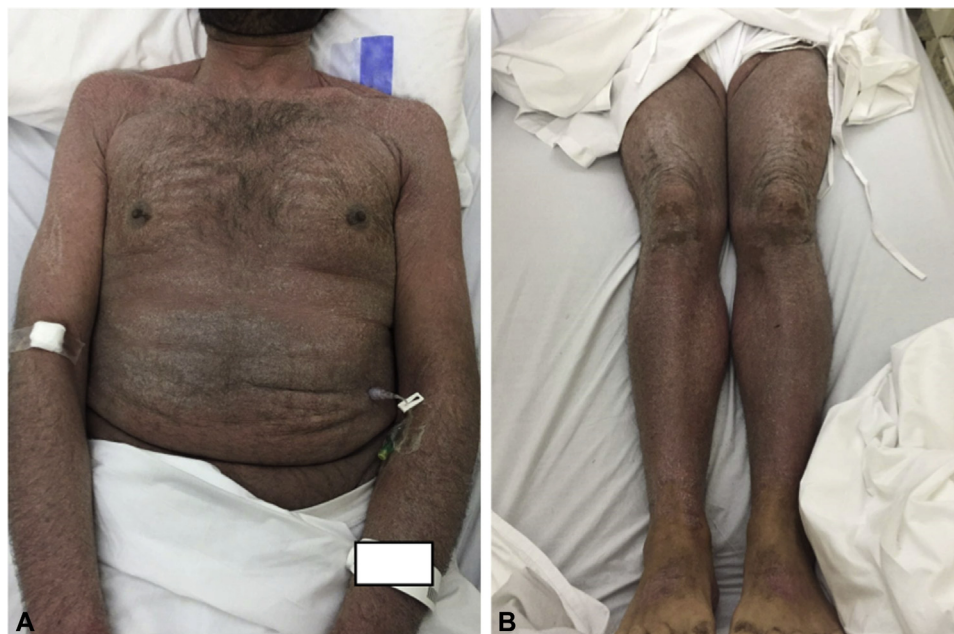
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**Fig 1.** Erythrodermic psoriasis. **A**, Trunk and upper limb. **B**, Lower limb.

presentation) underwent the Mantoux test for a pre-employment screening and noticed a clearing of psoriasis at that site (Fig 2). The patient did not recall a similar clearing when he previously underwent prebiologic therapy screening. Furthermore, clearing did not occur at other sites after venipuncture for blood studies or a skin punch biopsy.

Based on these observations, erythrodermic psoriasis was diagnosed. Two skin punch biopsies were performed to confirm the diagnosis and rule out Sézary syndrome. Further workup included a complete blood count, blood film, flow cytometry, analysis of the lactate dehydrogenase level, computed tomography of the chest-abdomen-pelvis, and lymph node biopsy to rule out lymphoma. Psoriasis was confirmed histologically, and cutaneous lymphoma was excluded (Fig 3, A and B). Furthermore, laboratory findings were unremarkable, the findings of computed tomography of the chest-abdomen-pelvis showed bilateral large axillary and inguinal lymph nodes. The results of the lymph node biopsy showed dermatopathic lymphadenitis, which has resolved upon follow-up.

## DISCUSSION

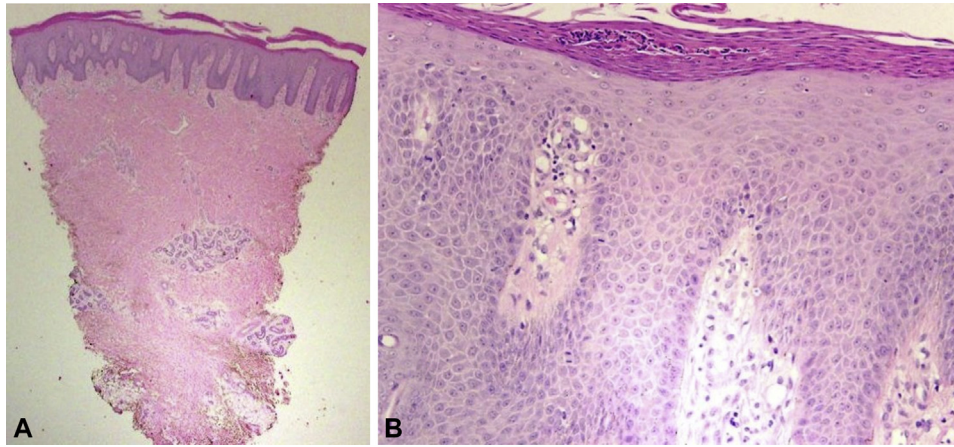
The Mantoux test is a diagnostic tool for tuberculosis, in which a purified protein derivative is injected intradermally, thereby resulting in a delayed type of hypersensitivity reaction represented by local skin induration.<sup>12</sup> The Mantoux test causes epidermal injury; therefore, it could theoretically induce koebnerization.<sup>13</sup> However, the pathogenesis of



**Fig 2.** Well-circumscribed clearing of the psoriatic lesion encircled with black ink.

koebnerization may also include immunologic, vascular, dermal, enzymatic, inhibitory, neural, growth, genetic, and hormonal factors.<sup>14</sup>

A case report of KP induced by the Mantoux test in a patient with psoriasis attributed the pathogenesis to epidermal injury and proinflammatory cytokine upregulation, which are responsible for the hypersensitivity reaction in positive purified protein derivative response.<sup>10</sup>



**Fig 3.** **A**, Low-power-field imaging of the skin biopsy shows regular psoriasiform hyperplasia. **B**, High-power-field imaging shows dry parakeratosis, neutrophilic collection in the keratin layer, loss of the granular cell layer, and dilated vessels in the papillary dermis. (Hematoxylin-eosin stain; original magnifications: **A**,  $\times 20$ ; **B**,  $\times 200$ .)

Additionally, mycobacterial heat-shock protein acting as antigenic stimulus to activate the immune response toward production of psoriatic skin lesions was hypothesized as a mechanism of induction of psoriasis after Mantoux testing.<sup>11</sup>

On the contrary, the mechanism by which mycobacterium immunotherapy leads to improvement of psoriasis has been suggested through downregulation of tumor necrosis factor- $\alpha$  levels<sup>15</sup> or by upregulation of interleukin-10 cytokines levels.<sup>16</sup>

Levin et al<sup>17</sup> proposed that controlled injury to the skin could alter cellular and extracellular milieu and possibly clear the dermatologic inflammatory process.<sup>17</sup> Furthermore, a newly defined concept known as locus majoris resistentiae describes a site of the body that offers greater resistance to immunity-related eruptions or skin disorders than the rest of the body owing to a localized immune dysregulation induced by intradermal vaccinations, trauma, infection, mosaicism, radiotherapy, or phototherapy.<sup>18</sup> Typically, the sparing phenomenon of locus majoris resistentiae occurs in a previously injured or diseased cutaneous site.<sup>19,20</sup>

## CONCLUSIONS

This is the first observation, to our knowledge, of a reverse KP with a Mantoux test in a patient with psoriasis. The pathogenesis of this observation warrants further investigation.

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