

Koebner phenomenon induced by failed revisional orthopedic surgery but remitted with bone union

A case report

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Abstract

Rationale: Trauma or surgical incision might cause Koebner phenomenon (KP) in patients with cutaneous diseases, but seldom studies reported KP induced by repeated orthopedic surgery.

Patient concerns: The 22-year-old man did not have any prior histories of cutaneous diseases. Two months after the revision surgery for nonunion of the left femoral shaft fracture, KP was noted by psoriasis presented at the surgical scar, left thigh, scalp, and trunk. Phototherapy and topical treatments were prescribed but the effect was limited.

Diagnosis: KP induced by failed revisional orthopedic surgery.

Interventions: Because of implant failure, he underwent the second revision surgery, which was performed on the previous scar surrounded and covered by psoriatic plaques.

Outcomes: After the second revision surgery successfully corrected the orthopedic problem, the psoriatic lesion remitted along with the bone union.

Lessons: In a patient having KP, to perform an operation on psoriatic lesion sites was safe and the surgical wound could heal well. The most important to treat KP induced by orthopedic surgery might be the underlying bone stability.

Abbreviation: KP = Koebner phenomenon.

Keywords: Koebner phenomenon, nonunion, psoriasis

1. Introduction

Koebner phenomenon (KP) refers to the appearance of isomorphic pathologic skin lesions on the uninvolved skin as a consequence of traumatic insults in patients who have cutaneous diseases.^[1,2] Several cutaneous diseases are related with KP, and psoriasis is the most common. Potential causes of KP include trauma, allergic or irritant reactions, drug reactions, and radiation.^[3] However, there are few studies reporting KP induced by orthopedic surgery. In this report, we presented a patient who developed KP after repeated orthopedic surgeries.

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Ethical approval is not required for the case report, but this patient signed informed consent for publication. The patient provided written informed consent for publication of this report and all accompanying images.

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2. Case report

A 22-year-old man had suffered from a traffic accident and was brought to our emergency department. The x-ray revealed a simple transverse fracture of the left femoral shaft (AO/OTA classification: 32A3). Physical examination showed no open wound or skin lesion. The patient had no systematic disease such as hypertension or diabetes mellitus, but morbid obesity with body mass index of 38 was noted. Then he underwent open reduction and internal fixation with an interlocking nail and was followed at an outpatient clinic.

Six months after surgery, the follow-up x-ray showed nonunion of the femur. Therefore, he was admitted for revision surgery by osteosynthesis with plating and allograft. The course of revision surgery was smooth and he did not have any specific complaints during hospitalization. However, many scaling erythematous plaques were noted on left thigh, scalp, and trunk 2 months after the revision surgery. He was referred to a dermatology clinic. Microbiological examination of the skin lesions did not reveal any growth of pathogenic microorganisms. Histopathological examination of skin biopsy taken from the lesions on the left thigh revealed parakeratosis, regular acanthosis of epidermis, absence of granular layer, thinning of the suprapapillary epidermis, and collection of neutrophils in the stratum corneum. Based on the clinical manifestations and the histopathological results, psoriasis vulgaris was diagnosed. Then he received phototherapy (ultraviolet light, range 0.036–0.15 J/cm²) for 12 times, desloratadine, and topical agents of fluocinonide cream and tazarotene cream. Tracing his history, the patient did not have any similar symptoms, rheumatic diseases, or related family history before.

Approximately 1 year after revision surgery, he suffered from persistent and worsening pain on left thigh and knee for 3 to 4



Figure 1. A, B, Psoriatic lesions surrounded the surgical wound after the second revision surgery for broken implant. C, D, Staples were removed on the 21st postoperative day. E, F, The surgical wound healed well 6 months after the second revision surgery and the psoriatic lesions remitted gradually.

months and even could not walk for 2 weeks. The x-ray showed the broken implant and nonunion at the fracture site. Therefore, the second revision surgery was arranged. Because his psoriasis did not subside after 1 year phototherapy and medication, the psoriatic skin lesions were disseminated on the posterior scalp, trunk, buttocks, and limbs. Notably, the psoriatic skin plaques were also around previous surgical scar on the left hip, which was the planned operation site of the second revision surgery. But we still decided to operate through the skin lesions. During the second revision surgery, we used routine skin preparation procedures. After removing the broken implant, a precontoured broad dynamic compression plate after decortication was applied and allografts mixed with artificial substitute were filled. The operation course was smooth and the surgical wound was closed by staples (Fig. 1 A, B). Postoperatively, once daily wound care was applied and the wound healed well without discharge, oozing, or any signs of inflammation or infection. The patient was discharged on the 6th postoperative day. Part of skin staples was removed on the 14th postoperative day and all staples were removed on the 21st postoperative day (Fig. 1 C, D).

Six months after the second revision surgery, his psoriasis got remission and the psoriatic lesions around the surgical wound also subsided. The wound scar was stable without hypertrophic change (Fig. 1 E, F). The follow-up x-ray showed partial union with callus formation at the fracture site. The patient provided

written informed consent for publication of this report and all accompanying images.

3. Discussion

KP was firstly described in 1876 by a German dermatologist, Heinrich Koebner. He reported the development of psoriatic lesions after skin trauma, such as tattoos, animal bites, and excoriations.^[1] Additional to trauma, various therapeutic procedures can provoke KP, for example, injection, irradiation, laser, and surgery incision.^[3-5] Although reports of KP caused by bone fracture or orthopedic procedures are limited, KP has been shown to develop after orthopedic procedures.^[6-8] Higuchi et al reported a 55-year-old woman who developed psoriatic lesions on both lower extremities several days after an implanted ceramic-on-ceramic total hip arthroplasty. Despite medical treatment, including immunosuppressive agents, the skin lesions persisted and extended to back and bilateral buttocks. However, the psoriatic lesions disappeared completely after revision surgery, which replaced the ceramic insert with a polyethylene-on-metal hip joint. In this case report, the author did not provide the patient's history of psoriasis.^[7] In another case report, a 30-year-old woman without a history of psoriasis received reconstruction of the third web for congenital syndactyly. After 4 months, she developed nail dystrophy,

onycholysis, and onychorrhexis of the right middle, ring, and little fingernails. Isolated nail psoriasis was diagnosed based on clinical and histopathological examinations. With proper treatment, the patient's psoriasis was not remitted but limited to the 3 fingernails.^[6] Nottrott et al described a 20-year-old man with psoriasis vulgaris underwent wide resection of extraosseous mesenchymal chondrosarcoma of the left thigh and reconstruction with femoral megaprosthesis. The psoriatic lesions presented extensively after the restaging examination and seemed more aggressively after the resection and reconstruction surgery. The author stated that the patient did not experience any wound infection or healing complications after adequate psoriasis treatment preoperatively and prolonged antibiotic prophylaxis.^[8]

In our case, the patient did not have any prior history of cutaneous disease and developed KP after the second orthopedic surgery for nonunion. Although the patient received treatments of phototherapy and topical agents, the effect was limited. However, the KP remitted gradually after the third revision surgery which successfully corrected the implant failure. Therefore, the instability of fracture fixation might be a provocative factor.

Psoriatic patients seem to have a higher risk of *Staphylococcus aureus* colonization than healthy individuals.^[9] However, Lynfield et al^[10] commented that psoriasis-involved skin could be sterilized by routine skin preparation and it was not necessary to avoid the psoriatic plaques during surgery. In our patient, we used routine intraoperative surgical antiseptic procedures and operated on the previous scar which was surrounded and covered by psoriatic lesions. Postoperatively, routine daily wound care was applied. Consistently with previous studies, his psoriatic lesions healed at a normal rate along with bone union and were not exacerbated by surgical skin preparation.^[10,11] Therefore, the patients with KP should not be deprived of surgical procedures. Once the associated insults being treated, psoriasis might be remitted subsequently as presented in our patient.

The pathogenesis of KP has not been completely understood. It may involve some nonspecific inflammatory substances, including cytokines, stress proteins, adhesion molecules, or autoantigens.^[12] These inflammatory products also play a role in

fracture healing.^[13,14] Therefore, we proposed that the provocative factor of KP in our patient might be not only the surgical incision but also the nonunion of fracture. Further investigations are warranted for the association of nonunion and KP.

4. Conclusion

In conclusion, to perform an operation on psoriatic lesion sites was safe for a patient having KP and the surgical wound could heal well. The most important to treat KP induced by orthopedic surgery might be the underlying bone stability.

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