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Case Report

The Koebner Phenomenon and First Episode of Psoriasis after Contact with Cold Metal in Fitzpatrick Type II Skin

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ABSTRACT

A female in her thirties with Fitzpatrick skin type II and a childhood history of atopic dermatitis presented with a first episode of psoriasiform plaques following localized trauma from contact with cold metal. Within 72 hr, the initially painful erythematous eruption evolved into well-demarcated, raised, scaly plaques consistent with plaque psoriasis morphology. The patient self-initiated symptomatic cooling with aloe vera gel prior to community medical assessment, after which she was treated with emollients and a low-potency topical corticosteroid (1% hydrocortisone), resulting in good clinical response. This presentation is suggestive of a Koebner phenomenon, whereby cutaneous trauma precipitates psoriatic lesions at sites of injury. However, the diagnosis remains uncertain given the absence of a prior personal history of psoriasis, raising the possibility that this episode represents the initial manifestation of latent disease rather than true Koebnerisation. Subsequently, the patient experienced recurrent plaque psoriasis episodes temporally associated with psychosocial stressors. The Koebner phenomenon has been variably reported across skin phototypes, with limited data in Asian populations; some studies describe post-inflammatory hypopigmentation following lesional resolution in darker skin types. In this case, transient pigmentary change was also observed following lesion resolution. This case highlights the diagnostic challenge in distinguishing trauma-induced Koebner response from first presentation of plaque psoriasis and underscores the potential role of physical injury and psychological stress as precipitating factors in susceptible individuals.

Keywords: Koebner Effect, Psoriasis, Steroid, Topical, Trauma.

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INTRODUCTION

The Koebner Phenomenon (KP), first described in 1876 by Heinrich Koebner, is the appearance of new skin psoriatic lesions on previously unaffected skin secondary to trauma, in patients with a diagnosis of psoriasis.[1,2] Cutaneous trauma has been cited in literature to develop into new psoriatic lesions in individuals already diagnosed with psoriasis, including burns and cuts.[3] Other skin lesions have been described as forming from the Koebner phenomenon, but are less frequently mentioned include vitiligo and lichen planus.[4] Psoriasis is a chronic autoimmune inflammatory condition which primarily affects the skin. The immune system becomes over-active and causes the skin cells to multiply too quickly, often forming raised scaley, itchy skin plaques.[5-7] Other kinds of psoriasis namely guttate and pustule are also known, but less common.[9] Psoriasis is a multi-systemic disease affecting the cardiovascular, renal system and may be simultaneously associated with arthritis.[8] A diagnosis may therefore have sequala for the individual's health in the future and is an common topic for medics and general practitioners. Psoriasis is thought to affect 125 million people worldwide and 2% of the American population.[9] The mean age of onset for the first presentation of psoriasis can range from 15 to 20 years of age, and some individuals may experience a second peak occurring at 55-60 years.[9] The Mechanism proposed by which the Koebner phenomenon may act to create new psoriatic lesions includes tryptase acting as a mitogen to increase the proliferation of epithelial cells and dermal fibroblasts. Tryptase is a protein serine protease, which is released by mast cells in inflammatory reactions[1] and may contribute to the development of new psoriatic lesions[2] Interestingly, the Koebner phenomenon is believed to be more frequent in actively spreading, severe psoriasis and in those with an early onset picture.[6] Research has not demonstrated connection of Koebner phenomenon with sex, age or family history of psoriasis. In dermatological research 'experimenting with the Koebner response', looked specifically at the 'all or nothing' principle whereby if psoriasis occurs in an area of injury then it 'occurs in all areas of injury'. After inducing trauma into skin of individuals, who already had a pre-existing diagnosis of psoriasis using 'pin pricks' some developed new lesions as per the Koebner response, but some did not. Leading

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to conclusions where not all trauma in individuals with psoriasis leads to formation of new injury.[7] The Koebner phenomenon is less recognised in individuals without a pre-existing psoriasis diagnosis. This case is a rarer phenomenon, whereby the individual developed a first episode of psoriasis after cutaneous trauma, having no pre-existing diagnosis of psoriasis. One question which this case study raises is whether the Koebner phenomenon would include brand new lesion with no prior psoriasis history, and in fact would this be a true Koebner phenomenon.

CASE PRESENTATION

An Asian female in her thirties, with a history of very mild childhood eczema and penicillin allergy (oedema), experienced a first episode of psoriasis after skin contact with cold metal. She was previously psoriasis free and had no previous skin lesion or healed lesions in the area of concern, where the new psoriasis lesions appeared. Her skin was a light brown (Asian ethnicity), Fitzpatrick type II (usually burns rather than tans). Her maternal grandmother had a history of pustular psoriasis which she experienced in older age after stress with responded well to UV treatment. She was taking part in pole dancing class for the first time and was wearing shorts. The pole was very cold meal, and she had struggled to slide down it and experienced some burning sensation to bilateral upper medial thighs when sliding down. She made a handful of attempts with the pole, and on the way home felt uncomfortable in the medial thighs- and attributed this to the pole and likely friction burns. Within 24 hr, she had developed a painful widespread well demarcated and raised rash in both medial thighs. The rash was sensitive to any clothing being worn and became warm quickly. The rash had white raised lines on top of a red rash and flakey skin. It calmed down with aloe vera which is all she had to hand at the time. The rash persisted and was painful, and became more aggressive to hot water, and she began to have a sponge Bath to control water flow rather than showers. Within the next 48-72 hr, the rash became raised and plaque like and scaley. It was more painful and required simple analgesia. It was itchy along with the hot and she was unable to wear lose fitting clothes around the thighs. She noticed that the lesions had spread to cover both medial areas of the upper thighs, which had both been in contact with the cold metal pole.

This individual received a diagnosis of psoriasis, with first episode that may be triggered from the 'Koebner phenomenon' 'where new skin lesions appear on previously unaffected skin secondary to trauma. It was managed with 0.1% corticosteroid cream, emollient and cool showers. It was then questioned whether this was a true phenomenon as the individual had no pre-existing psoriasis, but a history of eczema.

Investigations

The patient had a set of bloods done shortly after the triggering event and found that the ESR was slightly raised at 25, but otherwise other bloods were Normal. The patient had been well in herself, and a spot diagnosis was made.

Differential diagnosis

The rash looked like a bruise and was painful at first, at the site where the skin had contacted the metal. The rash became a raised well defined itchy lesion within a few days with scaley patches, which made the lesions more recognisable as plaque psoriasis. Before the lesions becoming itchy and well defined, they looked like widespread bruises across both thighs and the itching resembled eczema, however they were not on flexor surfaces, a usual site for the patient's eczema. This new rash was also painful, and warm too at times. The differentials changed as the rash evolved but was eventually treated as psoriasis.

Outcome and follow up

After the initial event, the patient was followed up by the GP and later referred to a dermatologist for symptom management. Fortunately, the lesions on the thigh reduced in size and intensity however there remained a vulnerable site and future lesions appeared there. Areas of hypopigmentation were left where the lesions once were, which are taking time to heal. The patient developed Psoriasis following this triggering event, on other sites of her body which appeared in response to stressful situations. The Psoriatic lesions were plaques, slightly scaling and itchy and treated with 1% hydrocortisone and emollient with good effect.

DISCUSSION

Although the Koebner response may be limited to individuals who already have an existing history of psoriasis[1] and may not necessarily apply to individuals with a new diagnosis of psoriasis, there may be other avenues to explore of first presentation of psoriatic lesion in response to trauma. Koebner phenomenon demonstrates an "all or nothing" pattern of reactivity as mentioned, where a patient who reacts to one traumatic stimulus is likely to react to all stimuli, and an individual who has not reacted to a traumatic stimulus is likely to be non-reactive to all other traumatic stimuli as well.[10] In this case, the individual did not undergo repeated exposure to the triggering stimuli of the cold metal, however, did develop new psoriatic lesions elsewhere on the body. These new lesions may or may not have been due to trauma, but the individual did not recognise that the further psoriatic lesions on different sites had been induced by new traumatic responses.

Interestingly, data from 'experimental Koebner phenomenon found that not all pin pricks (as trauma) induce new psoriatic lesions[7] therefore, there may be areas where individual differences may be considered, and the response phenomenon may not always be consistent or replicable. One possible answer to the inconsistencies of the presence of Koebnerization in vitiligo (rather than psoriasis) also appears to correlate with higher

disease activity within the past 12 month to recent months. Lower response to treatment also appears to occur in vitiligo patients who exhibited Koebnerization.

Current clinical guidelines from National Institute for Health and Care Excellence (NICE, 2017) suggest that for first episodes of psoriasis, emollient and calcitriol may be prescribed, alongside low dose corticosteroid cream. Simple analgesia may be used for pain and recommend for the affected area to be kept hydrated.[11] Often, psoriasis may be accompanied by feelings of anxiety and if the lesions persist then low mood is also common. As a result, mental health may need to be addressed. General Practitioners may refer patients to a dermatologist in the event of a continuous uncontrolled flare or discuss with inpatient hospital services if the patient becomes very unwell. The majority of cases of the Koebner response have been documented in Caucasian ethnicities, and it would be interesting to research in future if the Koebner response varies in its pattern in different ethnic groups.

CONCLUSION

In conclusion, awareness of the Koebner phenomenon is important, as cutaneous lesions may develop at sites of physical or direct trauma in otherwise atypical circumstances, reflecting an underlying pathophysiological response. In clinical practice, when assessing a new dermatological diagnosis, it is essential to obtain a detailed history of preceding skin trauma. A family history of cutaneous disease, particularly when symptoms are precipitated by stress, may indicate an underlying genetic susceptibility. An unresolved area for further investigation is whether the Koebner phenomenon encompasses the initial presentation of psoriasis triggered by cutaneous injury in individuals with no prior history of the disease.

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ABBREVIATIONS

CG: Clinical Guideline; **ESR:** Erythrocyte Sedimentation Rate; **GP:** General Practitioner; **KP:** Koebner Phenomenon; **NICE:** National Institute for Health and Care Excellence; **PMCID:** PubMed Central Identifier; **PMID:** PubMed Identifier; **UV:** Ultraviolet.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTION

Dr Priya Kadam: Visualisation, Conception, Reading, Writing, Editing, Revising. **Dr Irrum Aneela:** Supervision, Review.

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