Rapid Progression of Linear Porokeratosis Following COVID-19 Vaccination: A Case Report

Dear Editor,

Linear porokeratosis (LPK) is characterized by a linear arrangement of brown keratotic papules that enlarge into annular plaques, typically present from birth or childhood. We noted a case of LPK limited to the left index finger since childhood, with rapid progression following the coronavirus disease 2019 (COVID-19) vaccination.

A healthy 42-year-old lady had asymptomatic lesions over the tip of the left index finger since childhood, which started progressing rapidly after 2 to 4 weeks following the second dose of the COVID-19 vaccination (ChAdOx1-S/nCoV-19 coronavirus vaccine (recombinant)) in 2021 and reached the left forearm. The first dose of vaccination was taken 3 months before the second dose. She is hypertensive, controlled by medication. There was no significant family history. A general physical and systemic examination revealed no other abnormalities. There were hyperpigmented annular plaques, a few coalescing to form polycyclic lesions arranged linearly over the dorsum of the left index finger, from the left hand up to the mid-left forearm, along with nail dystrophy in the left index finger [Figure 1a and b]. We kept the differential diagnoses as LPK, linear granuloma annulare, and linear annular lichen planus. Dermoscopy (DermLite DL200 HR, polarized mode) was performed, which showed central brownish blotches along with hypopigmented and erythematous blotches surrounded by a black thread-like border. A few terminal hairs are also seen [Figure 2]. A punch biopsy was performed, and histopathology showed a moderately dense superficial perivascular patchy lichenoid lymphocytic infiltrate with focal interface vacuolar change. In a single focus, the epidermis showed a shallow invagination of the floor, which lacks a granular layer, while the wall exhibited hypergranulosis. Rising from the center of this invagination is a tiny column of parakeratotic cells (coronoid lamella (CL)), suggesting superficial porokeratosis [Figure 3]. We came to our final diagnosis as LPK, which got aggravated by the COVID-19 vaccination. As it has a higher malignant potential, prompt diagnosis, treatment, and follow-up are required. The patient was treated with compounded 2% rosuvastatin in white petroleum jelly for 4 weeks, followed by 12 weeks of acitretin 25 mg and 5-fluorouracil 1% cream, resulting in significant improvement in itching. The affected area became lighter in color and flatter [Figure 1b, after 16 weeks].

Porokeratosis is a disorder of keratinization marked by aberrant terminal differentiation of keratinocytes with raised margins, known as CL. LPK is a rare variant

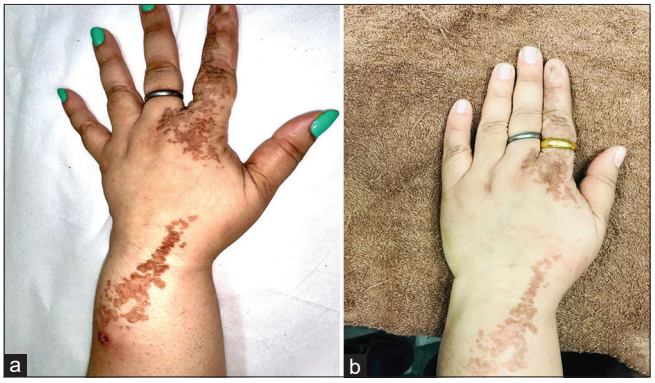

Figure 1: (a) Linear porokeratosis over the left hand and left forearm with nail dystrophy in the left index finger; (b) After 16 weeks of treatment, lesions became lighter in color and flatter; initial treatment with 2% rosuvastatin for 4 weeks, followed by 12 weeks of acitretin 25 mg and 1% 5-fluorouracil. Nail dystrophy in the left index finger also showed improvement; all other nails are normal

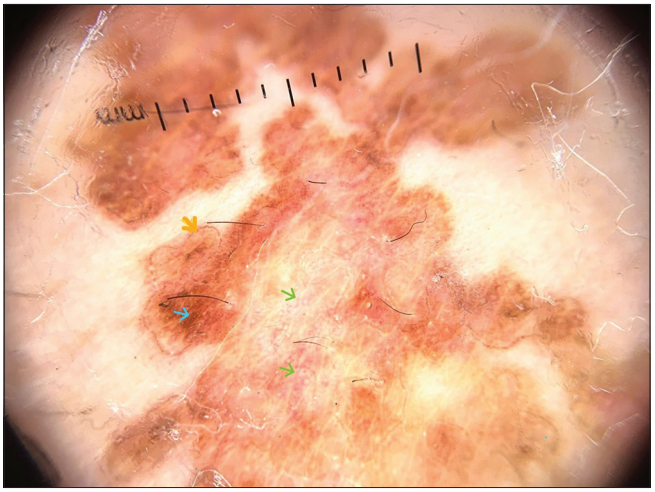

Figure 2: Central brownish blotches (blue arrow) along with hypopigmented and erythematous blotches (green arrow) surrounded by a black thread-like border (yellow arrow). Few terminal hairs are also seen (DermLite DL200 HR,Polarized,10x)

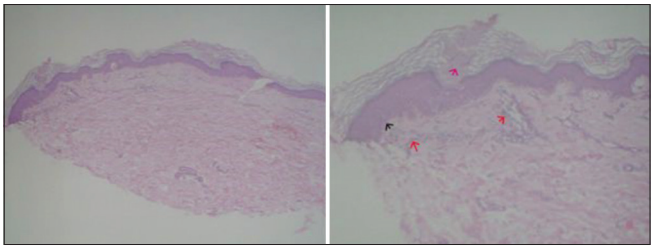

Figure 3: Epidermis shows a shallow invagination of the floor, which lacks a granular layer, while the wall shows hypergranulosis. Rising from the center of this invagination is a tiny column of parakeratotic cells called coronoid lamella (pink arrow). Moderately dense superficial perivascular patchy lichenoid lymphocytic infiltrate (red arrow) with focal interface vacuolar change (black arrow) (H&E; 10x, 40x)

of porokeratosis characterized by CL, which presents unilaterally along the lines of Blaschko. It manifests as small hyperpigmented brown keratotic papules that gradually enlarge into annular plaques with well-demarcated thread margins.[1,2]

The etiologies of porokeratosis are diverse, involving abnormalities in genes such as MVD (mevalonate kinase), PMVK (phosphomevalonate kinase), SLC17A9(solute carrier family 17 member 9) and FDPS (farnesyl diphosphate synthase).[3] Local and systemic immunosuppression, leading to reduced immune surveillance and dysregulated keratinocyte proliferation, is a well-established theory. In LPK, somatic mutations during embryonic development can cause loss of heterozygosity in differentiating cells, resulting in mosaic patterns along Blaschko's lines.[4] P16 (INK4A) protein overexpression has been observed in congenital LPK. Sporadic mutations, observed in adult-onset LPK, lack clearly defined triggers. Various factors such as ultraviolet (UV) light exposure, electron beam therapy, radiation therapy, immunosuppression, transplant procedures, immunodeficiency syndromes, chronic renal or liver diseases, hematological malignancies, infections (herpes simplex, human immunodeficiency virus (HIV), and hepatitis C), and certain drugs (etanercept and adalimumab) have been associated with porokeratosis.[1,3] Notably, vaccination has not been documented as a trigger in the literature. The temporal relationship between vaccines and rapid LPK progression suggests a potential link, necessitating further extensive study.

No cases known to the authors have been reported so far, although there are a few reports of other keratinization disorders following COVID-19 vaccination in the literature and the exacerbation of preexisting dermatoses.[5] We considered two potential mechanisms for vaccine-induced aggravation of porokeratosis: 1) The COVID-19 vaccine may trigger herpes reactivation, possibly due to an immune reaction to messenger ribonucleic acid (mRNA) vaccines or innate or cell-mediated immune defense failures initiated by the host response to vaccination.[6] 2) The vaccine initiates a host response, causing a state of immune defense failure, which can lead to dysregulated abnormal keratinocyte clonal proliferation.[3,4] It is interesting to note that the first dose did not generate a response, prompting further exploration of this immunological puzzle.[5] It remains uncertain whether the first dose triggered the pathological process; however, clinically noticeable changes were only observed 2–4 weeks after the second dose.

Dermoscopy reveals central brown pigmentation with blue-gray dots encircled by a single hypopigmented band and a white track at the periphery, similar to our case.[2] The distinctive histopathological feature of porokeratosis is CL, which is a column of tightly fitted parakeratotic cells seen in the epidermis, accompanied by an absent granular layer and dyskeratotic cells in the upper spinous layer.[2]

Treatment options include 5-fluorouracil, topical calcipotriene, topical retinoids, cryotherapy, surgical excision, and systemic retinoids. Emerging therapies such as photodynamic therapy, ingenol mebutate, and 3-hydroxy 3-methylglutaryl-CoA (HMG) CoA inhibitors (topical cholesterol or lovastatin) are under investigation, and the last one is considered safer and effective.[3]

The incidence of malignancy in LPK is up to 20%, with reported cases of Bowen's disease, squamous cell carcinoma, basal cell carcinoma, and melanoma in long-standing porokeratosis.[3]

Further studies are needed to confirm the correlation between COVID-19 vaccination and the rapid progression of LPK, as well as to investigate the underlying mechanisms.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and that due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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