Linear Porokeratosis: A Case Report and Review of the Literature

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GOAL

To understand porokeratosis to better manage patients with the condition

OBJECTIVES

Upon completion of this activity, dermatologists and general practitioners should be able to:

1. Describe the 5 variants of porokeratosis.
2. Discuss the diagnosis of porokeratosis.
3. Identify treatment options for porokeratosis.

CME Test on page 474.

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Linear porokeratosis refers to 1 of 5 variants of porokeratosis. Porokeratosis is a keratinization disorder of multiple etiologies including genetic aberrancy, trauma, and infection. We review a case of a 35-year-old man with a chronic history of linear porokeratosis and conduct a review of porokeratosis subtypes, etiology, histology, pathology, differential diagnosis, and treatment.

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The opinions expressed are those of the authors and are not to be construed as official or as representing the US Air Force.

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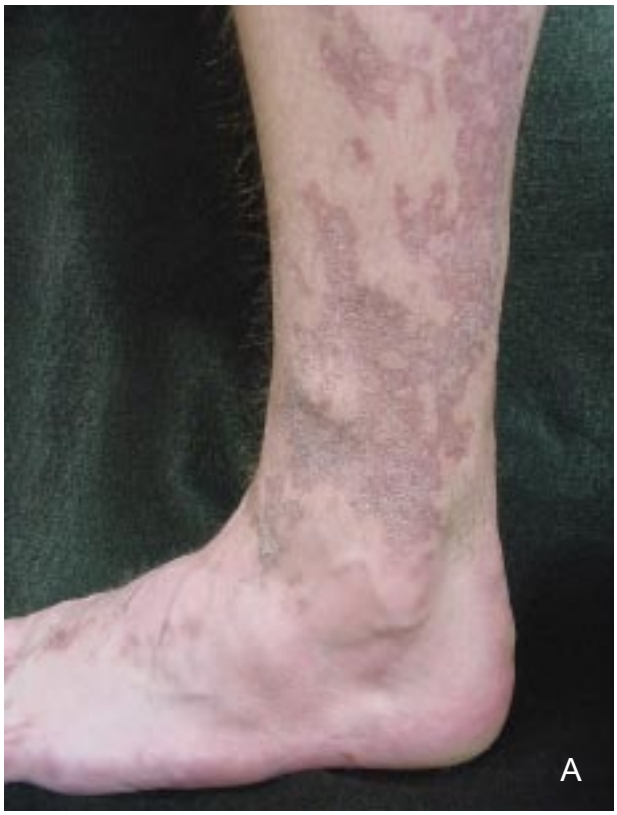
Case Report

A 35-year-old man presented to the dermatology clinic for medical clearance to receive smallpox vaccination. The patient was diagnosed with eczema that first appeared on the left lower leg at 6 months of age. The rash was asymptomatic and unresponsive to antifungal creams and topical steroids. Over the course of 20 years, there was an increase in the number of lesions that developed up his calf, upper leg, scrotum, and penis. He denied trauma to any of the lesion sites, immunosuppression, viral exposure, or sunburn that may have led to new lesions. He admitted that the

lesions were more sensitive to sunburn and mosquito bites. More recently, the patient noticed a similar lesion on his right lower leg. There was no family history of similar rash or hepatic or internal malignancy. His only medication was atenolol for hypertension. Results of a physical examination revealed a linear, deep red, atrophic plaque on the left leg with single lesions coalescing into a larger plaque on the lower leg (Figure 1A). The lesions had a prominent peripheral hyperkeratotic ridge (Figure 1B).



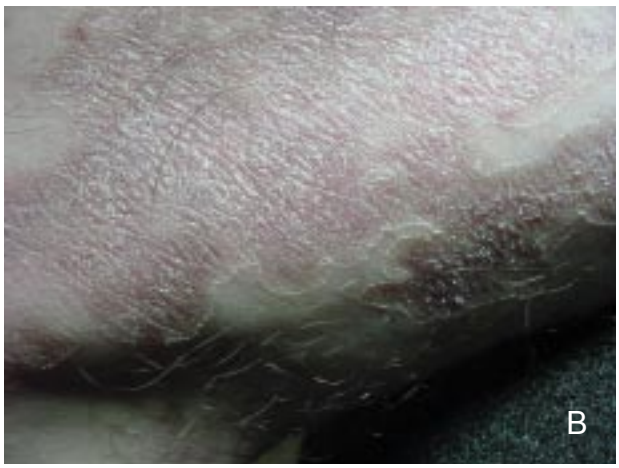


Figure 1. Linear, deep red, atrophic plaque on the left lower leg (A). The lesions had a prominent peripheral hyperkeratotic ridge (B).

The plaque appeared to follow the Blaschko lines with extension onto the foot and terminating with pterygium of the proximal nail folds of the second and third toes. Linear porokeratosis was suspected and a biopsy specimen of the peripheral ridge and the central atrophic areas revealed cornoid lamellae with loss of the granular layer with focal lymphocytic infiltrate (Figure 2). The patient was given a trial of fluorouracil cream 5% applied topically to a test spot for 2 weeks. There was no response and the medication was discontinued. He elected not to pursue alternative treatments.

Comment

Classically described by Mibelli[1] and Respighi[2] in 1893, porokeratosis is a keratinization disorder involving a sharply demarcated annular lesion, peripheral hyperkeratotic ridge with a longitudinal furrow, and central atrophic crater. The following 5 clinical variants are currently recognized: classic porokeratosis of Mibelli, disseminated superficial actinic porokeratosis, porokeratosis palmaris et plantaris disseminata, linear porokeratosis, and punctate porokeratosis (Table).[3] Linear porokeratosis is the unilateral linear variant with identical Mibelli morphology; however, these lesions are found grouped along the distal portion of the extremities in a linear distribution. Linear porokeratosis is strictly unilateral and may involve the entire side of the body (ie, arm, leg, trunk, face). Lesions vary in size (0.5–1.0 cm), height (≥1 mm), and number (few to many). The lesions are characterized by small, brownish, keratotic papules that slowly enlarge from childhood to form irregular annular plaques with well-demarcated 1-mm raised borders. The center generally is atrophic with anhidrosis and alopecia.[3]

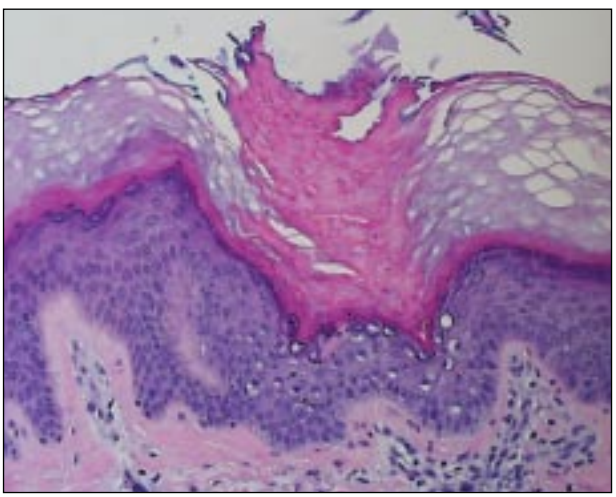


Figure 2. Typical cornoid lamellae (H&E, original magnification ×200).

Selected Characteristics of Porokeratosis Variants

Variant	Location	Characteristics	Inheritance	Sequelae
Classic porokeratosis of Mibelli	Extremities, anywhere	Prominent cornoid lamellae, typically few lesions (≤20 cm)	Autosomal dominant	Increase in number and size, malignant degeneration reported
Disseminated superficial actinic porokeratosis	Anywhere (disseminated variant), sun-exposed areas (actinic variant)	Indistinct cornoid lamellae development, uniform lesions (≤1.0 cm)	Autosomal dominant	Rapid dissemination, malignant degeneration reported
Porokeratosis palmaris et plantaris disseminata	Palms, soles, disseminates across body	Cornoid lamellae, prominent keratotic ridge, disseminated, uniform lesions (≤1.0 cm)	Autosomal dominant	Malignant degeneration reported, bone and nail dystrophy
Linear porokeratosis	Distal extremities with unilateral linear distribution	Prominent cornoid lamellae characteristics, large plaques can develop	Mosaicism	Malignant degeneration reported, bone and nail dystrophy
Punctate porokeratosis	In association with other porokeratosis variants, palms and soles	Discrete, punctate, hyperkeratotic, seedlike lesions; thin peripheral ridge; uniform lesions; cornoid lamellae	Autosomal dominant	None reported

Classic porokeratosis of Mibelli, disseminated superficial actinic porokeratosis, porokeratosis palmaris et plantaris disseminata, and punctate porokeratosis are characterized by autosomal dominant inheritance. Some reports suggest mosaicism may give rise to aberrant hyperkeratotic events for linear porokeratosis.[4,5] Because coexistent observations have been made regarding the disseminated superficial actinic and linear variants of porokeratosis, a conclusion of a common genetic aberration at chromosome 12, 15, or 18 may be postulated.[6-10] There seems to be multiple etiologies. Porokeratosis has been observed in skin tissue that has been burned[11] or damaged by UVA/UVB radiation from artificial light[12,13] and irradiation sources.[14] Herpes simplex virus type 1[15,16] and hepatitis C virus infections also have been observed in patients with porokeratosis.[17,18] Transplants and concurrent immunosuppression have led to disseminated and fatal malignant degeneration.[19-24]

The cornoid lamella, a thick column of parakeratotic cells extending outward from a notch in the malpighian layer of the epidermis, is the basis for the ridgelike border in all variants. This classic finding is believed to be a peripheral clonal expansion of aberrant keratinocytes,[25] which is supported by the presence of helper T cells, suppressor T cells, and Langerhans cells approximating the cornoid lamella, perhaps providing a stimulatory signal.[26] The cornoid lamella arises in the interfollicular epidermis and consists of a tightly packed column extending through the entire stratum corneum. The granular layer is missing below the cornoid lamella and vacuolated keratinocytes are found at its base. The center of the lesion is atrophic, with possible liquefaction or colloid body formation and flattening of the rete ridges. The dermis may be edematous with telangiectasia. Both classic porokeratosis of Mibelli and the linear variant share histologic features. Disseminated superficial actinic porokeratosis lesions are small and uniformly distributed. They tend to present as discrete keratotic papules with a less than prominent ridge (1–3 mm in diameter) that spreads over sun-exposed skin or extensor surfaces of the extremities.[3] Porokeratosis palmaris et plantaris disseminata begins on the palms and soles and disseminates across the body. The keratotic ridge is more pronounced and these lesions tend to be pruritic.[3] Punctate porokeratosis lesions are discrete, punctate,

hyperkeratotic, and seedlike, and are surrounded by a thin peripheral ridge.[27]

Diagnosis of all variants usually is confirmed clinically with visualization of a continuous ridge and furrow and histopathologically with demonstration of cornoid lamellae. Based on presentation, the differential diagnosis would include entities of similar location and morphologic features or those expressing linearity. The differential diagnosis for a plaque of the extremity of similar description may include elastosis perforans serpiginosa, lichen sclerosus et atrophicus, lichen planus, plaque stage of cutaneous T-cell lymphoma, or punctate keratoderma.[28,29] Treatment includes destruction using cryotherapy, electrodesiccation, dermabrasion, or CO_2 laser.[30,31] Successful treatment also has been observed by inducing a cell-mediated/cytotoxic response using 5-fluorouracil and imiquimod cream 5%.[32,33] Retinoid therapy has yielded inconsistent results.[34,35] All porokeratosis variants tend to increase in size and number with accelerated growth with UV exposure or decreased immune status.[12] To date, no study has determined the frequency of porokeratosis that degenerates to malignancy, yet squamous cell carcinoma has been observed in linear porokeratosis as well as other variants.[36-38] Interestingly, the protein p53 has been considered as a possible marker of malignant degeneration in patients with confirmed porokeratosis.[39-41] Aside from malignant degeneration, it has been observed that porokeratosis palmaris et plantaris disseminata and linear porokeratosis may rarely cause bone and nail dystrophy.[42-45]

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