

An atypical presentation of a rare entity: Linear Porokeratosis

Dr. Anup Kumar Tiwary¹, Dr. Saumya P. Tirkey², Dr. Dharmendra Kumar Mishra³, Dr. S.S. Chaudhary⁴

¹Postgraduate Resident; Department of Dermatology, Venereology and Leprosy, RIMS, Ranchi, India

²Senior Resident; Department of Dermatology, Venereology and Leprosy, RIMS, Ranchi, India

³Associate Professor; Department of Dermatology, Venereology and Leprosy, RIMS, Ranchi, India

⁴Professor and head; Department of Dermatology, Venereology and Leprosy, RIMS, Ranchi, India

Abstract: Linear porokeratosis is a rarest type among five classical type of porokeratosis manifested by grouped hyperkeratotic annular lesions with distinct keratotic edge and atrophic centre, arranged in linear pattern along the line of Blaschko usually on distal extremities. It probably results from an abnormal clone of epidermal precursors. Herein we are documenting a rare case of linear porokeratosis in a 24 years old male born of non-consanguineous marriage and no family history, presenting with grouped annular lesions in linear array following the lines of Blaschko on the left forearm and left thigh since his childhood. The involvement of proximal part of the left lower limb rather than distal, unlike the typical presentation of this disorder, makes this much more rarer. Revelation of distinct histopathological features on microscopic evaluation confirmed this entity.

Keywords: Hyperkeratotic annular, Keratotic edge, linear porokeratosis

I. Introduction

Linear porokeratosis is the rarest type among five classical types of porokeratosis. Linear porokeratosis is clinically characterized by sharply demarcated hyperkeratotic grouped annular plaques with distinct keratotic edge and atrophic centre, arranged in linear array along the line of Blaschko, usually on the distal part of extremity. [1] It is often congenital and usually inherited as a mosaic form of autosomal dominant mode. [1] It is listed as a rare disease by Office of Rare Diseases (ORD) of the National Institute of Health, meaning thereby that it affects fewer than 20,000 people in U.S population. Very few cases of linear porokeratosis have been documented in India also.[2]

II. Case Report

A 24 years old male came to our outpatient department with asymptomatic, small annular plaques in a linear array over left forearm and thigh since his early childhood. He was born of non-consanguineous marriage and there was no family history of similar lesions. During childhood, the lesion initially started as grouped annular plaques on the extensor aspect of left lower forearm and distal part of left thigh, then over the time lesions gradually extended upwards in linear fashion up to the elbow and proximal thigh.

On general physical examination and systemic examination, patient was normal. Cutaneous examination revealed the presence of multiple discrete and grouped annular plaques presenting linearly along the lines of Blaschko on the left forearm and thigh. The lesions were hyperkeratotic and had keratotic edges but without distinct furrowing [Fig.1] [Fig.2]. They was more involvement of the proximal area than of the distal area of left lower limb. No other area was involved. Hair, nail, teeth and mucosa were normal on examination.

Linear epidermal verrucous nevus and porokeratosis were kept as differential diagnosis and a punch biopsy sample was taken from thigh and sent for HPE.



Figure 1: Hyperkeratotic grouped plaques with distinct keratotic edge in linear pattern on left forearm



Figure 2: Hyperkeratotic annular grouped plaques with distinct keratotic edge in linear pattern on left thigh

III. Histopathological Examination

Histopathology revealed keratin-filled angulated epidermal invagination in the hyperkeratotic epidermis. A characteristic poorly staining parakeratotic column of stratum corneum cells, 'cornoid lamella' were seen running through the surrounding normal staining cells at the center of this invagination. In the epidermis beneath the parakeratotic column, the keratinocytes are vacuolated and spongiotic having pyknotic nuclei. Granular layer was thinned out at the base of the parakeratotic column [Fig. 3].



Figure 3: poorly staining parakeratotic column of stratum corneum cells, 'cornoid lamella' seen running through the surrounding normal staining cells at the center of this invagination. In the epidermis beneath the parakeratotic column, the keratinocytes are vacuolated and spongiotic having pyknotic nuclei. Granular layer was thinned out at the base of the parakeratotic column. (H & E, x 40)

IV. Discussion

Porokeratosis is a disorder of keratinization characterized clinically by sharply demarcated annular lesion, peripheral hyperkeratotic ridge with a longitudinal furrow & central atrophy and histologically by the presence of 'cornoid lamella', a column of parakeratotic cells extending through the stratum corneum. [1] Since its first description by Mibelli and Respighi in 1893, many new variants of porokeratosis have been described. Classically, five clinical types have been recognized as follows: 1) classic porokeratosis of mibelli 2) disseminated superficial porokeratosis (DSP) and disseminated superficial actinic porokeratosis (DSAP); 3) porokeratosis palmaris et plantaris disseminata ; 4) Linear porokeratosis; and 5) punctate porokeratosis. [3] [4][5] Besides these, there are a few rare atypical morphological variants such as facial porokeratosis, giant porokeratosis, punched-out porokeratosis, hypertrophic verrucous porokeratosis and reticulate porokeratosis are reported in the literature. [1]

Although porokeratosis has been a well known entity for more than hundred years, the exact pathogenesis of the disorder still remains an enigma. Generally porokeratosis has been considered as an autosomal dominant disorder with variable penetrance. It is suggested that when an autosomal dominant disorder occurs in a mosaic arrangement the lesions may be particularly severe. [6] [7] In such cases the

segmental involvement may be superimposed on a more diffuse involvement. [7] The genetic aberration at three loci on chromosome 12p,15q25 and 1p31.3-p31 have been seen to be associated with linear type. [8-12] Apart from genetic susceptibility UVA/UVB radiation, viral infections (especially Herpes simplex virus 1, Hepatitis B and C viruses, HIV), burn and immunosuppression have been proposed to play a role in triggering the abnormal clonal proliferation of keratinocyte precursors stimulated by helper T cells, suppressor T cells, and Langerhans cells approximating the cornoid lamella. [13-22]

Linear porokeratosis is a distinctive type, which has further been classified into localized and generalized forms based upon the distribution of lesions. Linear porokeratosis is the unilateral linear variant with identical histopathology to porokeratosis of mibelli but as the name implies, clinically the lesions of linear porokeratosis are grouped annular hyperkeratotic plaques with keratotic edge, arranged linearly along the Blaschko lines on distal portion of the extremities in a linear distribution. It affects men twice as often as women. [2] Linear porokeratosis is usually unilateral and may involve the entire side of the body. Lesions vary in size (0.5–1.0 cm), height (≥ 1 mm), and number. [5] The lesions are characterized by small, brownish-black, keratotic papules that gradually enlarge to form irregular annular plaques with well-demarcated raised borders and may extend in upward fashion. The centre of the lesion is usually atrophic with anhidrosis and hair loss.

The histopathological hallmark of all types of porokeratosis is “cornoid lamella”, which is a thick column or stacks of parakeratotic cells arising in the interfollicular epidermis extending outward from a notch in the malpighian layer of the epidermis. The granular layer is attenuated or absent below the cornoid lamella and vacuolated keratinocytes are found at its base. [2] The center of the lesion is atrophic, with possible liquefaction or colloid body formation and flattening of the rete ridges. There may be dermal edema and telangiectasia. The eccrine acrosyringia and hair follicles remain normal without any overlying cornoid lamellae.

Clinical diagnosis of all cases of linear porokeratosis warrants histopathological evaluation to look for any dysplastic or malignant changes because it has significant risk of developing malignancies especially Bowen’s disease, squamous cell carcinoma and basal cell carcinoma, most likely occurring in older adults. [2] Chromosomal instability, allelic loss and reduced immune surveillance with overexpression of p53 are hypothesized to play a role in the development of cutaneous malignancies in porokeratosis. [1] It is found that 7.5 percent of porokeratosis patients develop a skin malignancy in their lifetime and it is much more in case of linear type. The risk factors associated with development of malignant change include long-standing lesions, increasing age, linear porokeratosis, presence of large lesions on extremities and certain medical conditions including immunosuppression, being a recipient of organ transplantation, burn scars, Crohn's disease, and end-stage liver disease. [2]

Diagnosis of all types of porokeratosis is usually based on clinical grounds with visualization of a peripheral hyperkeratotic, continuous ridge and furrow and histopathological demonstration of cornoid lamellae further confirm it. Based on the presentation, the differential diagnosis of linear porokeratosis would include linear verrucous epidermal nevus, linear lichen planus, lichen striatus and porokeratotic adnexal ostial nevus (PAON) including both porokeratotic eccrine and hair follicle nevus (PEHFN) and porokeratotic eccrine ostial and dermal duct nevus (PEODDN). [23] First three disease entities can easily be ruled out by the absence of distinctive ‘cornoid lamella’ which is a hallmark of all forms of porokeratosis. PAON (PEHFN or PEODDN) can be differentiated from linear porokeratosis by the presence of certain peculiar features which are not present in porokeratosis and they are: erythema or blistering, comedo-like lesions, cornoid lamella over dilated and hyperplastic eccrine ostia and/ or hair follicles. Additionally, furrowing in the thread keratotic ridge are not appreciated in case of PAON. Thus collectively these features are sufficient to differentiate PAON from linear porokeratosis.

Various treatments have been reported to be beneficial. Available treatment options include topical formulations of retinoids, imiquimod and 5-fluorouracil, oral formulations of retinoids like acitretin or etretinate and destructive modalities (cryotherapy, electrodesiccation, dermabrasion, or CO2 laser). [24-33]

V. Conclusion

The rarity of this entity and significant risk of malignant changes associated with this type of porokeratosis warrants its reporting in the literature.

References

- [1]. Giovanni E. Lorenz, DO; Steven E. Ritter, MD. Linear Porokeratosis: A Case Report and Review of the Literature. *Cutis*. 2008;81:479-483.
- [2]. Malhotra SK. Linear porokeratosis. *Dermatology Online Journal* 2007;13:15.
- [3]. Mibelli V. Contributo allo studio della ipercheratosi dei canali sudoriferi. *G Ital Mal Veneree Pelle*. 1893;28: 313-355.
- [4]. Respighi E. Di una ipercheratosi non ancora descritta. *G Ital Mal Veneree Pelle*. 1893;28:356-386.
- [5]. Wolff-Schreiner EC. Porokeratosis. In: Fitzpatrick T, Eisen A, Wolff K, et al, eds. *Dermatology in General Medicine*. Vol 1. 5th ed. New York, NY: McGraw-Hill; 1999:624-630.

- [6]. Ousager LB, Brandrup F, Brasch-Andersen C, et al. Skin manifestations in a case of trisomy 16 mosaicism. *Br J Dermatol.* 2006;154:172-176.
- [7]. Happle R. Dohi Memorial Lecture. new aspects of cutaneous mosaicism. *J Dermatol.* 2002;29:681-692.
- [8]. Dover JS, Phillips TJ, Burns DA, et al. Disseminated superficial actinic porokeratosis. coexistence with other porokeratotic variants. *Arch Dermatol.* 1986;122:887-889.
- [9]. Kaur S, Thami GP, Mohan H, et al. Co-existence of variants of porokeratosis: a case report and a review of the literature. *J Dermatol.* 2002;29:305-309.
- [10]. Xia K, Deng H, Xia JH, et al. A novel locus (DSAP2) for disseminated superficial actinic porokeratosis maps to chromosome 15q25.1-26.1. *Br J Dermatol.* 2002;147: 650-654.
- [11]. Wu LQ, Yang YF, Zheng D, et al. Confirmation and refinement of a genetic locus for disseminated superficial actinic porokeratosis (DSAP1) at 12q23.2-24.1. *Br J Dermatol.* 2004;150:999-1004.
- [12]. Wei SC, Yang S, Li M, et al. Identification of a locus for porokeratosis palmaris et plantaris disseminata to a
- [13]. 6.9-cM region at chromosome 12q24.1-24.2. *Br J Dermatol.* 2003;149:261-267.
- [14]. Nova MP, Goldberg LJ, Mattison T, et al. Porokeratosis arising in a burn scar. *J Am Acad Dermatol.* 1991;25: 354-356.
- [15]. Katugampola RP, Finlay AY. Fake sun tan diagnosis of porokeratosis. *J Eur Acad Dermatol Venereol.* 2006;20: 224-226.
- [16]. Fleischer AB Jr, Donahue MJ, Feldman SR. Tanning salon porokeratosis. *J Am Acad Dermatol.* 1993;29(5, pt 1): 787-788.
- [17]. Romani J, Pujol RM, Casanova JM, et al. Disseminated superficial porokeratosis developing after electron-beam total skin irradiation for mycosis fungoides. *Clin Exp Dermatol.* 1996;21:310-312.
- [18]. Jang YH, Chun SJ, Kang WH, et al. Eruptive disseminated superficial actinic porokeratosis in an immunocompetent
- [19]. host: is this associated with herpes simplex virus or bacterial infection? *J Am Acad Dermatol.* 2004;51:1018-1019.
- [20]. Webster GF. Are porokeratoses an infection [letter]? *Arch Dermatol.* 2001;137:665.
- [21]. Mizukawa Y, Shiohara T. Porokeratosis in patients with hepatitis C virus infection: does hepatitis C virus infection provide a link between porokeratosis and immunosuppression? *Br J Dermatol.* 1999;141:163-164.
- [22]. Kono T, Kobayashi H, Ishii M, et al. Synchronous development of disseminated superficial porokeratosis and hepatitis
- [23]. C virus-related hepatocellular carcinoma. *J Am Acad Dermatol.* 2000;43:966-968.
- [24]. Reed RJ, Leone P. Porokeratosis—a mutant clonal keratosis of the epidermis. *Arch Dermatol.* 1970;101: 340-347.
- [25]. Jurecka W, Neumann RA, Knobler RM. Porokeratoses: immunohistochemical, light and electron microscopic evaluation. *J Am Acad Dermatol.* 1991;24: 96-101.
- [26]. Taru Garg MD, Ramchander MD, Bincy Varghese MD, Meenu Barara MD, Anita Nangia MD. Generalized linear porokeratosis: A rare entity with excellent response to acitretin. *Dermatology Online Journal* 17 (5): 3
- [27]. Rabbin PE, Baldwin HE. Treatment of porokeratosis of Mibelli with CO2 laser vaporization versus surgical excision with split-thickness skin graft. a comparison. *J Dermatol Surg Oncol.* 1993;19:199-203.
- [28]. Barnett JH. Linear porokeratosis: treatment with the carbon dioxide laser. *J Am Acad Dermatol.* 1986;14 (5, pt 2):902-904.
- [29]. Hubler WR Jr, Michaelson JD, Knox JM. Linear porokeratosis. *Cutis.* 1974;14:61-64.
- [30]. Harrison S, Sinclair R. Porokeratosis of Mibelli: successful treatment with topical 5% imiquimod cream. *Australas J Dermatol.* 2003;44:281-283.
- [31]. Pehamberger H, Konrad K. Treatment with an oral aromatic retinoid in linear porokeratosis. *Dermatologica.* 1980;160:270-274.
- [32]. Goldman GD, Milstone LM. Generalized linear porokeratosis treated with etretinate. *Arch Dermatol.* 1995;131:496-497.