Клиническая дерматология и венерология
2019, т. 18, № 3, с. 338-344
https://doi.org/10.17116/klinderma201918031338

Russian Journal of Clinical Dermatology and Venereology =
Klinicheskaya dermatologiya i venerologiya 2019, vol. 18, no 3, pp. 338-344
https://doi.org/10.17116/klinderma201918031338

Порокератоз и его клинические варианты

© Н.Н. ПОТЕКАЕВ, В.Г. АКИМОВ, Е.С. ФОМИНА, Т.В. ЧИСТЯКОВА, М.А. БОБРОВ

ГБУЗ «Московский научно-практический центр дерматовенерологии и косметологии» Департамента здравоохранения Москвы, Москва, Россия

РЕЗЮМЕ

Представлены собственные наблюдения нескольких клинических вариантов порокератоза, описаны генетические с аутосомно-доминантным типом наследования и средовые факторы, включающие интенсивность инсоляции, сопутствующие заболевания, лекарственно индуцированную иммуносупрессию, способствующие его возникновению. Согласно современной классификации, выделяют локализованные и диссеминированные формы. К локализованным относят порокератоз Мибелли, линейный порокератоз, ладонно-подошвенный точечный, генитальный, перианальный порокератоз; к диссеминированным — поверхностный актинический, поверхностный диссеминированный, диссеминированный ладонно-подошвенный, систематизированный линейный порокератоз. Многообразие форм порокератоза при идентичности гистологических признаков позволяет считать их клиническими вариантами одного заболевания. Методы лечения включают как наружную терапию — цитостатические препараты, аналоги витамина D_3, иммуномодуляторы, ингибиторы кальциневрина, ретиноиды, так и системную — ретиноиды, а также хирургическое иссечение очагов, криотерапию, электродиссекцию и кюретаж образований, дермабразию очагов и фотодинамическую терапию. Кроме того, пациенты должны быть информированы об использовании солнцезащитных средств и эмолиентов. Выбор метода лечения определяется формой заболевания, локализацией, прогнозом, а также косметическими показаниями. Важны своевременная диагностика и наблюдение за пациентами, страдающими порокератозом (особенно линейной формой), и лицами с иммуносупрессией, поскольку риск возникновения плоскоклеточного рака кожи в очагах у таких пациентов повышен.

Ключевые слова: порокератоз, клинические варианты.

Потекаев Н.Н. — https://orcid.org/0000-0002-9578-5490
Акимов В.Г. — https://orcid.org/ 0000-0003-1859-3572
Фомина Е.С. — https://orcid.org/ 0000-0003-3430-0055
Чистякова Т.В. — https://orcid.org/ 0000-0002-1850-2338
Бобров М.А. — https://orcid.org/ 0000-0001-7374-0374

КАК ЦИТИРОВАТЬ:
Потекаев Н.Н., Акимов В.Г., Фомина Е.С., Чистякова Т.В., Бобров М.А. Порокератоз и его клинические варианты. *Клиническая дерматология и венерология*. 2019;18(3):338-344. https://doi.org/10.17116/klinderma201918031338

Porokeratosis and its clinical variants

© N.N. POTEKAEV, V.G. AKIMOV, E.S. FOMINA, T.V. CHISTYAKOVA, M.A. BOBROV

Moscow Research and Practical Center for Dermatovenereology and Cosmetology, Department of Healthcare, Moscow, Russia

ABSTRACT

Observations of several clinical variants of poroceratosis are presented. Genetic factors with autosomal dominant type of inheritance and environmental factors, including the intensity of insolation, concomitant diseases, drug-induced immunosuppression, contributing to its occurrence, are described. According to the modern classification, localized and disseminated forms are distinguished.
Localized ones include porokeratosis of Mibelli, linear porokeratosis, palmar-plantar punctate, genital, perianal porokeratosis; disseminated ones are superficial actinic, superficial disseminated, disseminated palmar-plantar, systematized linear porokeratosis. The variety of porokeratosis forms along with the identity of histological signs allows to consider them to be a clinical variants of one disease. Methods of treatment include both external therapy — cytostatic drugs, vitamin D3 analogues, immunomodulators, calcineurin inhibitors, retinoids, and systemic — retinoids, as well as surgical excision of foci, cryotherapy, electrodissection and curettage of formations, dermabrasion of foci and photodynamic therapy. In addition, patients should be informed about the use of sunscreen and emollients. The choice of treatment option is determined by the form of the disease, localization, prognosis, and cosmetic indications. Timely diagnosis and monitoring of patients suffering from porokeratosis (especially linear form), and persons with immunosuppression, is important because the risk of squamous cell carcinoma of the skin in the foci in such patients is elevated.

Keywords: porokeratosis, clinical variants.

Potekaev N.N. — https://orcid.org/0000-0002-9578-5490
Akimov V.G. — https://orcid.org/ 0000-0003-1859-3572
Fomina E.S. — https://orcid.org/ 0000-0003-3430-0055
Chistyakova T.V. — https://orcid.org/ 0000-0002-1850-2338
Bobrov M.A. — https://orcid.org/ 0000-0001-7374-0374

TO CITE THIS ARTICLE:
Potekaev NN, Akimov VG, Fomina ES, Chistyakova TV, Bobrov MA. Porokeratosis and its clinical variants. *Russian Journal of Clinical Dermatology and Venereology = Klinicheskaya dermatologiya i venerologiya*. 2019;18(3):338-344. (In Russ.). https://doi.org/10.17116/klinderma201918031338

Автор, ответственный за переписку: Фомина Е.С. — e-mail: esfomina@mail.ru

Corresponding author: Fomina E.S. — e-mail: esfomina@mail.ru

Porokeratosis is a heterogeneous group of rare chronic diseases characterized predominantly by hyperkeratotic lesion of the epidermis.

Etiology and pathogenesis. Dermatosis is inherited in an autosomal dominant fashion with incomplete gene penetrance; family cases are observed in all clinical variants of porokeratosis with varying frequencies. The association of disseminated actinic porokeratosis with the chromosome 12 locus was first established in 2000 upon study of a family case of the disease in China [1]. To date, there is evidence that several chromosome loci (12q23.2-24.1, 12q21.2-24.21, 18p11.3, 1p31.3-p31.1и 16q24.1-24.3, 12q24.1-24.2, 15q25.1-26.1) are responsible for the development of disseminated superficial actinic porokeratosis and porokeratosis plantaris, palmaris et disseminata [2–5]. In case of localized forms of porokeratosis, such as porokeratosis of Mibelli and zosteriform porokeratosis, mosaicism occurs, in which somatic mutations result in a local loss of heterozygosity [6]. A group of Chinese researchers found clear evidence of a link between the mutation in the mevalonate kinase (MVK) gene and disseminated superficial actinic porokeratosis. Mevalonate kinase is an enzyme encoded by the mevalonate kinase gene (*MVK*). This enzyme is involved in the mevalonate metabolic pathway, which plays a crucial role in the synthesis of many biologically active compounds required for cellular metabolism. The study on the effect of its expression on the activity of keratinocytes revealed that MVK is involved in calcium-induced differentiation of keratinocytes, and that *MVK* expression can protect the cells from UVA-induced apoptosis. In addition, MVK plays an important role in keratinocyte differentiation by regulating the expression of keratin 1 in the spinous layer and involucrin in the granular layer [7].

Solar insolation, PUVA therapy, and radiation therapy are the trigger factors for disseminated actinic porokeratosis and porokeratosis of Mibelli [8]. Immunosuppression-induced porokeratosis may develop with the use of various drugs: prednisone and azathioprine, etanercept and adalimumab, and immunomodulating drugs in organ transplant recipients [9–13]. The incidence of porokeratosis in patients after organ transplantation accounts for 1–11% [14]. There have been cases of porokeratosis developed in HIV-infected patients, patients with diabetes mellitus, liver diseases and malignant neoplasms of various organs [15–20]. The relationship between porokeratosis and immunosuppression is still not fully understood. It is possible that immunosuppression can stimulate the expression of a mutant cell clone both directly and indirectly through epidermal differentiation [21]. Production of HLA-DR antigens by the epidermal Langerhans cells in the foci on the skin of the kidney transplant recipients is reduced, which suppresses local immunity and causes porokeratosis [22].

Clinical manifestations

Five main forms of porokeratosis are distinguished based on the clinical picture of the disease.

1. Classical porokeratosis of Mibelli.
2. Linear (zosteriform) porokeratosis.
3. Disseminated superficial actinic porokeratosis.
4. Eruptive disseminated superficial porokeratosis.
5. Porokeratosis plantaris, palmaris et disseminata.

Some authors also highlight giant porokeratosis, verrucous porokeratosis, and eruptive pruritic porokeratosis. However, porokeratosis palmaris et plantaris disseminata (porokeratosis of Mantoux) is classified as palmar-plantar keratoderma but not as keratosis [23, 24].

Classical porokeratosis of Mibelli is usually observed in males. Dermatosis can occur at any age: starting from the first months of life and until the old age. The predominant localization of lesions is palms and soles **(fig. 1)**. However, they can also involve other areas, including skin on any part of the body, mucous membranes of the mouth and genitals. Scalp lesions border with cicatricial alopecia. The initial manifestations usually present small (up to 0.5 cm in diameter) painless nodules of conical shape and a grayish brown hue. A groove with a horn plug is visible in the center area, while the edges elevate in the form of an annular horny ridge. Gradually increasing in size, the lesion turns into a plaque over the course of several years, which usually does not exceed 5 cm in diameter but in some cases can be larger, up to 15x25 cm in size [25]. The edges of the foci are clear, they are formed by a brown keratotic ridge with a typical configuration: the inner part rises vertically, while the outer one is more horizontal. A groove is visible in individual sections of the ridge. The thickness of the edges varies greatly. The width of the ridge can reach 1 cm and resemble a real horn in the sole area, which is subjected to friction with shoes, or on giant plaques. In closed areas (body skin), the edges are barely visible and can be defined by palpation. The border can be fragmented, intermittent. The central part might resemble normal skin. In most cases (especially in case of large plaques), it is atrophic, shiny, and hairless. The skin in the lesion area is pigmented or covered with telangiectasias. In some cases, the center becomes squamous, with pronounced keratosis. The classical form of Mibelli's po-

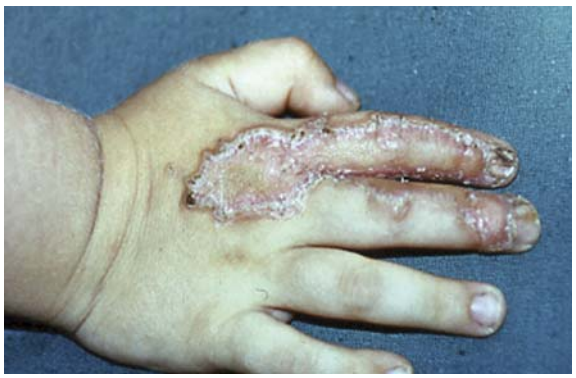

Fig. 1. **The classic variant of porokeratosis of Mibelli.**

rokeratosis can manifest itself both as a solitary plaque and as a group of smaller individual lesions separated by visually intact skin. Their center remains keratotic or verrucous. Subjective sensations are usually absent; sweating in this area is reduced or absent.

Linear porokeratosis differs from the classical one by zosteriform distribution of annular plaques in Zakharyin–Ged zones **(fig. 2)**. The number of plaques and the extent of the lesion vary significantly. However, all of the morphological features of Mibelli's porokeratosis persist: the sunken center and the elevated peripheral zone in the form of a keratotic ridge with a noticeable longitudinal strip.

Eruptive disseminated superficial porokeratosis (Respighi variant) is characterized by the appearance of multiple eruptions located in different parts of the body skin. It usually affects the skin of the upper and lower extremities, face, and nape area **(fig. 3)**. Lesion elements have clear contours, they are polycyclic, irregular or oval in shape, and of 2 to 4 cm in diameter. Axes drawn through their longer edge are usually arranged in a certain order: vertically or horizontally. The color is yellowish/brownish; the center is smooth, atrophic, slightly sunken in relation to the level of the surrounding skin. The border is very thin and shiny in the transmitted light. It can be distinguished from actinic porokeratosis by the larger sizes of the lesion elements, the lack of strict association with the open areas of the body and frequent complaints of itching from the patient.

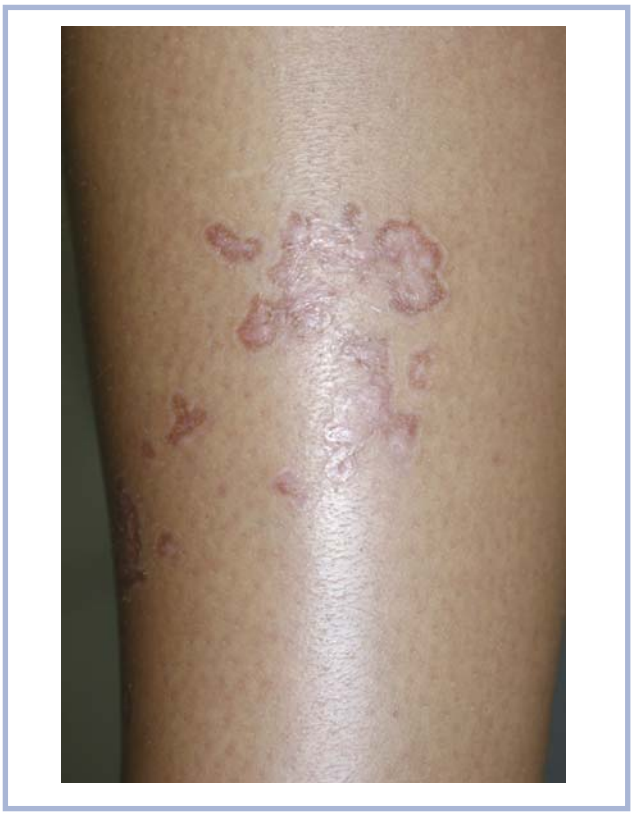

Fig. 2. **Linear (zosteriformis) porokeratosis.**

Disseminated superficial actinic porokeratosis is much more common than the classical form of Mibelli's porokeratosis. It occurs in predisposed subjects of both sexes but more often in women, aged 30 to 60 years; it is often diagnosed in several members of the same family [26, 27]. It manifests itself as numerous small spotted lesions of yellowish/brown color not exceeding 5-8 mm in diameter, with an atrophic center surrounded by a narrow elevated hyperkeratotic ridge with a groove on the surface **(fig. 4)**. In some cases, it is so narrow that it can be detected more easily by palpation than visual examination. It is localized symmetrically in open areas of the skin: legs, forearms, hands, rarely on the face and neck. Palms and soles are never affected. The clinical peculiarity of this form of porokeratosis is in the disseminated nature of the eruptions, their small size, absence of a tendency to fusion and plaque formation, as well as localization on the skin areas open to the direct sunlight. In contrast to the classical form of porokeratosis, which is more often diagnosed in males, the actinic variant prevails in women. The pathogenetic role of solar radiation is confirmed by cases of exacerbation of the disease in the summer: the peripheral border thickens, the center turns pink and becomes more pigmented, itching may occur, new lesion elements may appear. At the end of winter, lesion elements tend to become pale, with some of which becoming barely noticeable.

Porokeratosis plantaris, palmaris et disseminata was described only in eight members of a family in four generations in 1971 [28]. The traits are clinically and histologically similar to those of the classical porokeratosis of Mibelli with the exception that the lesions are localized mainly on the palms and soles. Some plaques with an elevated edge can reach up to several centimeters in size.

Histopathology

For all clinical forms of porokeratosis, diagnostically significant morphological changes are identical and usually located in the peripheral part of the focus. The most characteristic trait is the so-called cornoid lamella, a special type of keratinization represented by columnar structures ("columns") of compact horny masses with preserved nuclei originating from invagination of the epidermis, epidermal part of the sweat duct or epithelium of the hair follicle **(fig. 5, 6).** There is no granular layer under the "columns". In some cases, vacuolization of the spinous and basal keratinocytes, dyskeratosis, dysplasia (from mild form to *in situ* carcinoma) are noted. In other areas, the epidermis can have normal thickness with acanthosis and elements of atrophy [29-31]. The inflammatory reaction can be non-specific and of lichenoid type histologically resembling atrophic lichen planus or lupus erythematosus. Lichenoid inflammatory reaction is more common in disseminated actinic form of porokeratosis. In this case, melanophages and colloid bodies can be observed in the upper parts of the dermis [29, 30] **(fig. 6)**. Immunohisto-

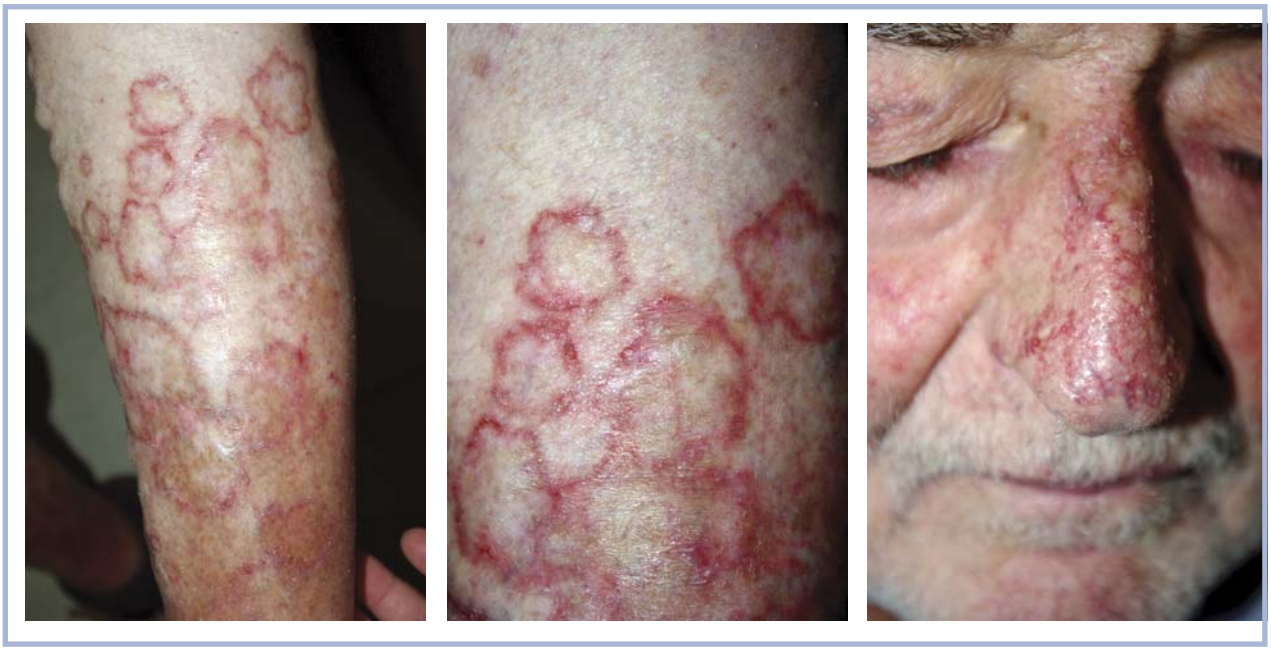

Fig. 3. **Disseminated superficial eruptive porokeratosis.**

chemical study of porokeratosis, as in case of many types of malignant tumors, indicates nuclear overexpression of a tumor suppressor protein, p53, in keratinocytes located under cornoid lamella. This may serve as a potential explanation of oncogenesis in case of porokeratosis. However, unlike for tumors, there have been no p53 mutations found to be associated with porokeratosis so far [31, 32].

Diagnosis and differential diagnosis. The variety of clinical manifestations of porokeratosis can make timely diagnosis difficult. Initial manifestations can resemble warts, cutaneous horn, and verrucous nevi. Diagnosis of a single plaque of the classical form of Mibelli's porokeratosis usually does not present any difficulties. The superficial forms resemble atrophic lichen planus: rounded margins, pigmentation and atrophy in the center area, a thin peripheral rim with a slight areola. Mild itching or its complete absence, slow evolution of the lesions and a typical histological picture indicate the presence of porokeratosis.

Linear arrangement porokeratotic lesions resembles linear verrucous epidermal nevus or linear lesions of lichen planus.

Atrophic and pigmented annular lesions on the face may resemble discoid lupus erythematosus to a great extent. The same lesions of 1.5 cm in diameter with an atrophic center and a peripheral ridge are observed in the so-called subtropical lichen planus, which is often diagnosed among the inhabitants of the Middle East (Uzbekistan, Turkmenistan, Egypt, Iraq). Eruptions usually occur in open areas and recur in the summertime **(fig. 7).**

Actinic keratosis is manifested by local dry hyperkeratotic foci with a diameter not exceeding 1 cm with gray-

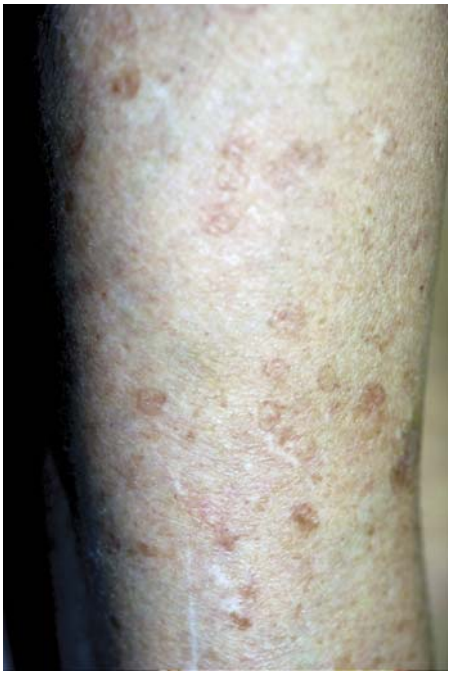

Fig. 4. **Disseminated superficial actinic porokeratosis.**

ish crusts on the surface. Typical localization is facial skin (nasal bridge, forehead), parietal areas lacking hair in men **(fig. 8)**. It occurs predominantly in individuals with a fair skin type, who has been subjected to excessive insolation. Slow transformation into squamous cell carcinoma is pos-

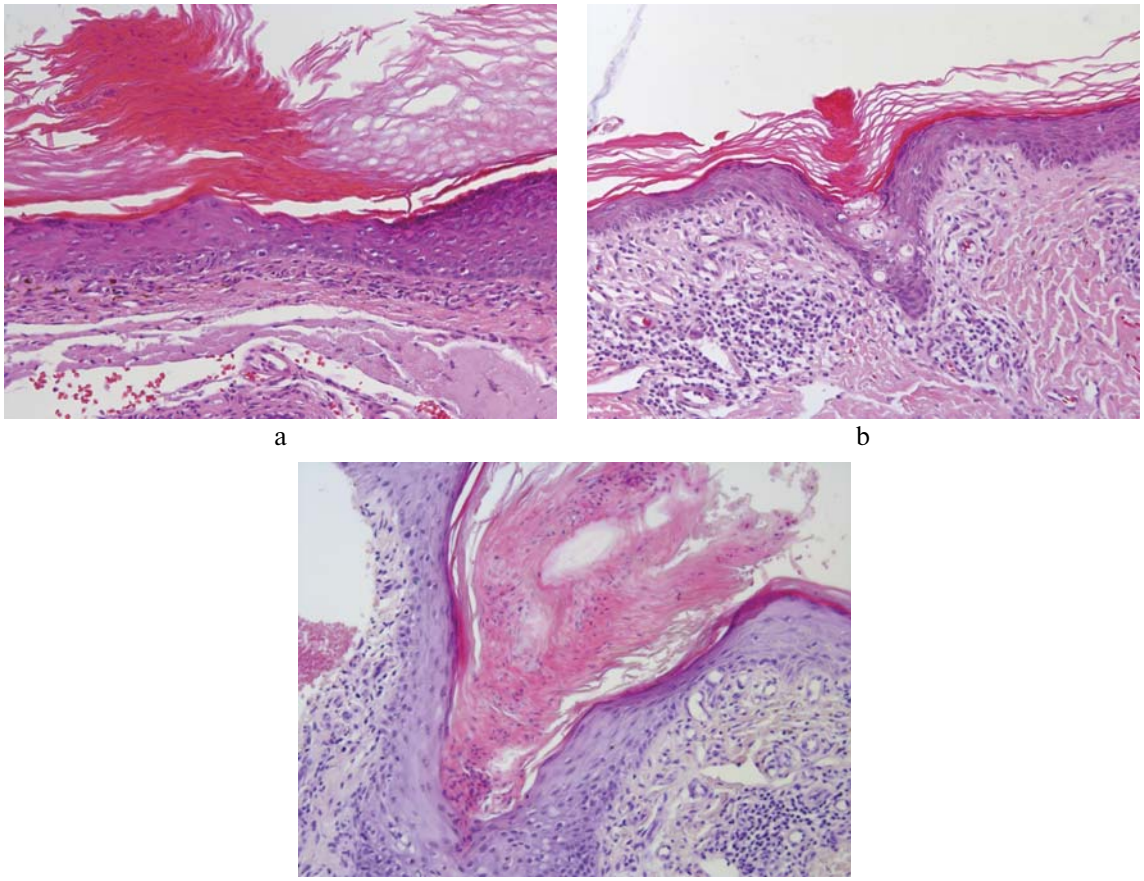

***Fig. 5. Cornoidlamella* originating from the epidermis (a), the duct of the sweat gland (b), the epithelium of the opening of the hair follicle (c).**
Stained with hematoxilin and eosin. magn. ×200.

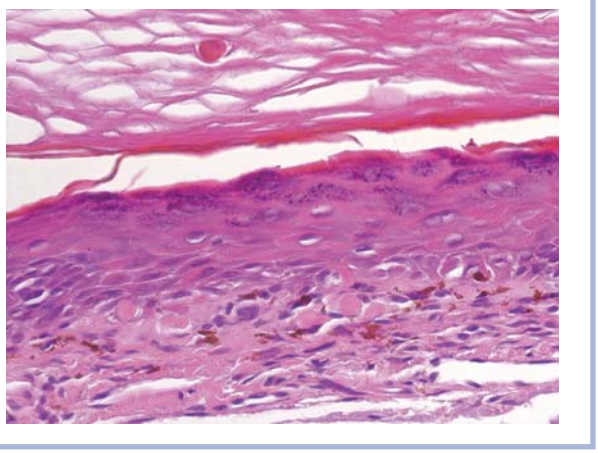

***Fig. 6.* Lichenoid inflammatory reaction in case of porokeratosis.**
The epidermis with vacuolization of basal layer cells` cytoplasm and atrophy. In the upper parts of the dermis — clusters of melanophages and colloidal cells, lymphohistiocytic infiltration.
Stained with hematoxilin and eosin. magn. ×400.

sible. Some clinical forms of porokeratosis require a differential diagnosis of such forms as porokeratosis of Mantoux and keratosis follicularis serpiginosa (Lutz-Miescher disease).

Porokeratosis can also occur on the mucous membrane of the oral cavity: palate, tongue, and cheeks, where the clinical picture resembles lichen planus, as well as on the mucous membrane of the genitals and on the lips. The combination of such eruption with skin manifestations facilitates the diagnosis, while isolated cases are rare.

Thus, the variety of porokeratosis forms sharing identical histological features allows us to consider them as clinical variants of the same disease but not as separate nosological entities as previously reported [33]. This statement is also confirmed by the cases of a combination of different clinical variants of porokeratosis in one patient [29].

Evolution of the lesions is very slow in case of the classical form: they exist for decades gradually increasing in

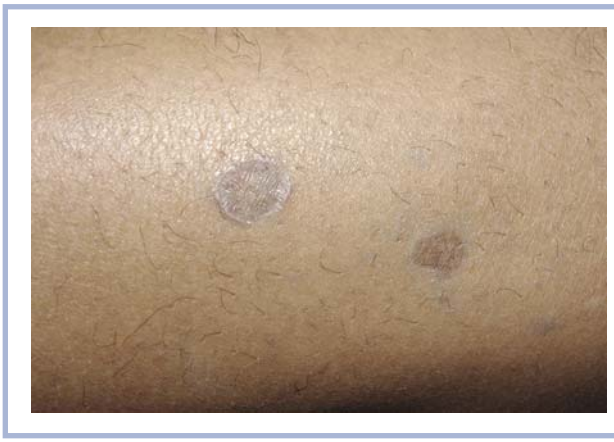

Fig. 7. **Subtropical red flat lichen.**

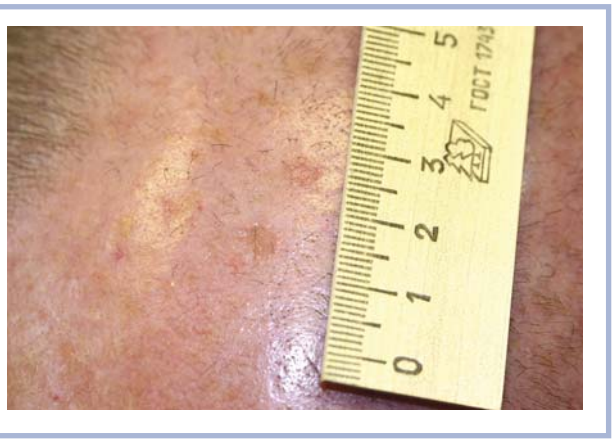

Fig. 8. **Actinic keratosis.**

size due to centrifugal growth. In some cases, new eruptions may appear in teenagers and adults. This phenomenon is more characteristic of males, since women experience improvement and even disappearance of some lesions during pregnancy, with mild atrophy remaining instead of the lesions. In cases of disseminated superficial or actinic porokeratosis, clinical manifestations can change more rapidly, including seasonal fluctuations (improvement during wintertime). In some cases, a significant improvement is observed even with short-term application of topical corticosteroids [34]. Cases of malignization of porokeratotic foci with development of squamous cell carcinoma, Bowen's disease, and basal cell carcinoma of the skin have been reported [35–38]. Patients with all forms of porokeratosis, especially with pronounced forms, should remain under the supervision of a dermatologist due to a chance of malignant transformation.

Treatment

Systemic retinoids at a dose of up to 1 mg/kg/day recommended by some authors show a temporary effect. However, they also have significant side effects. For cosmetic reasons, some lesions can be removed using laser evaporation, electrocoagulation, and cryotherapy. Photoprotective agents should be used in case of disseminated actinic porokeratosis.

The authors declare no conflicts of interest.

ЛИТЕРАТУРА/REFERENCES

1. Xia JH, Yang YF, Deng H, Tang BS, Tang DS, He YG, Xia K, Chen SX, Li YX, Pan Q, Long ZG, Dai HP, Liao XD, Xiao JF, Liu ZR, Lu CY, Yu KP, Deng HX. Identification of a locus for disseminated superficial actinic porokeratosis at chromosome 12q23.2-24.1. *J Invest Dermatol*. 2000 Jun; 114(6): 1071-1074.
2. Cao HM, Wang ZY, Zhang GW, Liu CF, Pan CM, Zhao SX, Song ZY, Song HD, Zhang L. Identification of a locus (DSP2) for disseminated superficial porokeratosis at chromosome 12q21.2—24.21. *Clin Exp Dermatol*. 2012;37: 672-676.
3. Liu P, Zhang S, Yao Q, Lio X, Wang X, Huang C, Huang X, Wang P, Yuan M, Liu JY et al. Identification of a genetic locus for autosomal dominant disseminated superficial actinic porokeratosis on chromosome 1p31.3—p31.1. *Hum genet*. 2008;123:507-513.
4. Wei SC, Yang S, Li M, Song YX, Zhang XQ, Bu L. Identification of a locus for porokeratosis palmaris et plantaris disseminata to a 6.9-cM region at chromosome 12q24.1—24.2. *Br J Dermatol*. 2003 Aug;149(2):261-267.
5. Xia K, Deng H, Xia JH, Zheng D, Zhang HL, Lu CY, Li CQ, Pan Q, Dai HP, Yang YF, Long ZG, Deng HX. A novel locus (DSAP2) for disseminated superficial actinic porokeratosis maps to chromosome 15q25.1—26.1. *Br J Dermatol*. 2002 Oct;147(4):650-654.
6. Happle R. Mibelli revisited: a case of type 2 segmental porokeratosis from 1893. *J Am Acad Dermatol*. 2010 Jan;62(1):136-138.
7. Sheng-Quan Zhang, Tao Jiang, Min Li, Xin Zhang, Yun-Qing Ren, Sheng-Cai Wei, Liang-Dan Sun, Hui Cheng, Yang Li, Xian-Yong Yin, Zheng-Mao Hu, Zhen-Ying Wang, Yuan Liu, Bi-Rong Guo, Hua-Yang Tang, Xian-Fa Tang, Yan-Tao Ding, Jian-Bo Wang, Ping Li, Bao-Yu Wu, Wen Wang Zhang *Exome sequencing identifies MVK mutations in disseminated superficial actinic porokeratosis*. Nature Genetics, 2012.
8. Знаменская Л.Ф., Чикин В.В., Каппушева И.А., Кондрашова В.В. Диссеминированный поверхностный актинический порокератоз у больного обыкновенным псориазом: клинический случай. *Вестник дерматологии и венерологии* 2015;(5): 91-96.
Znamenskaya LF, Chikin VV, Kappusheva IA, Kondrashova VV. Disseminated superficial actinic porokeratosis in patient suffering from plaque psoriasis: a case report. *Vestnik Dermatologii i Venerologii* 2015;5:91-96. (In Russ.).
9. Sertznig P, Von Felbert V, Megahed M. Porokeratosis: present concepts. *J Eur Acad. Dermatol Venerol*. 2011;26:404-412.
10. Anand D. Urticarial eruption with cornoid lamellae on etanercept for psoriasis. *American society for Dermatopathology Poster*. 2015 October 10-13; 178:2011.
11. Guaneri C, Cannavo SP, Lentini M, et al. Adalimumab induced superficial porokeratosis. *Ann Pharmacother*. 2011;45:280-281.
12. Raychaudhuri SP, Smoller BR. Porokeratosis in immunosuppressed and nonimmunosuppressed patients. *Int J Dermatol*. 1992 Nov;31(11):781-782.
13. Rothman IL, Wirth PB, Klaus MV. Porokeratosis of Mibelli following heart transplant. *Int J Dermatol*. 1992;31(1):52-54.

14. Herranz P, Pizzaro A, De Lucas R, Robayna MG, Rubio FA, Sanz A. High incidence of porokeratosis in renal transplantant recipients. *Br J Dermatol*. 1997 Feb;136(2):176-179.
15. Rodrigues EA, Jakubowicz S, Chinchilla DA, Carril A, Viglioglia PA. Porokeratosis of Mibelli and HIV-infection. *Int J Dermatol*. 1996 Jun;35(6):402-404.
16. Nakamura M, Fukamachi S, Tokura Y. Acute onset disseminated superficial porokeratosis associated with exacerbation of diabetes mellitus due to development of anti-insulin antibodies. *Dermatoendocrinol*. 2010 Jan;2(1):17-18.
17. Hunt SJ, Sharra WG, Abell E. Linear and punctate porokeratosis associated with end-stage liver disease. *J Am Acad Dermatol*. 1991 Nov;25(5Pt2): 937-918.
18. Cannavo SP, Borgia F, Adamo B, Guarneri B. Simultaneous development and parallel course of disseminated superficial porokeratosis and ovarian cancer: Coincidental association or true paraneoplastic syndrome? *J Am Acad Dermatol*. 2008 Apr;58(4):657-660.
19. Kono T, Kobayashi H, Ishii M, Nishiguchi S, Taniguchi S. Synchronous development of disseminated superficial porokeratosis and hepatitis C virus-related hepatocellular carcinoma. *J Am Acad Dermatol*. 2000 Nov;43(5 Pt 2):966-968.
20. Koang Hyun Choi, Tae Yoon Kim. A case of inflammatory disseminated superficial porokeratosis in a colon cancer patient. *Ann Dermatol*. 2009 May; 21(2):150-153.
21. Ponticelli C, Bencini PL.Disseminated porokeratosis in immunosuppresed patients. *Nephrol Dial Transplant*. 1996;11:2555-2554.
22. Bencini PL, Tarantino A, Grimalt R, et al. Porokeratosis and immunosuppression. *Br J Dermatol*. 1995;132:74-78.
23. Darier J. *Precis de dermatologie*. Collection de Précis Médicaux. Paris. 1928; 273.
24. Degos R. *Dermatologie*. Flammarion Médecine-Sciences. Paris. 1981;669.
25. Mandal RK, Das A, Kumar P. Giant porokeratosis with overling cutaneous hom and squamous cell carcinoma. *Indian J Dermatol Venereol Leprol*. 2017; 83:66-67.
26. Chernosky ME, Freeman RG. Disseminated superficial actinic porokeratosis. *Arch Derm*. 1967;96:611-624.
27. Каламкарян А.А., Акимов В.Г., Олисова М.О., Персина И.С. Актинический порокератоз. *Вестник дерматологии и и венерологии*. 1986;5:6-7.
Kalamkaryan AA, Akimov VG, Olisova MO, Persina IS. Actinic porokeratosis. *Vestnik Dermatologii i Venerologii*. 1986;5:6-7. (In Russ.).
28. Guss SB, Osborn RA, Lutzner MA. Porokeratosis plantaris, palmaris et disseminate. *Arch Derm*. 1971;104:366-373.
29. Dovar JS, Miller JA, Levene GM. Linear porokeratosis Mibelli and DSAP. *Clin Exp. Dermatol*. 1986;11(1):79-83.
30. Calonje E, Thomas Brenn T, Alexander Lazar A, Phillip H McKee PH: McKee's *Pathology of the Skin*, 4th Ed. Elsevier, 2008;94.
31. Shumack S, Commens C, Kossard S: Disseminated superficial actinic porokeratosis. A histological review of 61 cases with particular reference to lymphocytic inflammation. *Am J Dermatopathol*. 1991;13:26-31.
PMID: 2003645
32. Nelson C, Cowper S, Morgan M: p53, mdm-2, and p21waf-1 in the porokeratoses. *Am J Dermatopathol*. 1999;21:420-425.
PMID: 10535569
33. Потекаев Н.С., Потекаев Н.Н., Львов А.Н., Ястребова Р.И., Теплюк Н.П., Семенова В.Б. Порокератоз Мибелли. *Вестник дерматологии и венерологии*. 1999;2:48-50.
Potekaev NS, Potekaev NN, Lvov AN, Yastrebova RI, Teplyuk NP, Semenova VB. Porokeratosis Mibelli. *Vestnik Dermatologii i Venerologii*. 1999; 2:48-50. (In Russ.).
34. Ozkan S, Fetil E, Aydogan T, et al.: Lack of TP53 mutations in a case of porokeratosis palmaris, plantarisetdisseminata. *Dermatology*. 2000;201:158-161.
PMID: 1105392233.
35. Goulding JM, Teoh JK, Carr RA, et al. Eruptive disseminated superficial porokeratosis with rapid resolution: a drug-induced phenomenon? *Clin Exp Dermatol*. 2009;34(8):805-807.
36. Siyun Tan L, Wei-Sheng Chong. Porokeratosis in Singapure: an Asian perspective. *Australian J of Dermatol*. 2012;55:e40-e44.
37. Besenhard HM, Korting HC, Stolz W, Braun-Falco O. Disseminated superficial actinic porokeratosis with Bowen's desease. *Hautarzt*. 1988;39(5):285-290.
38. Снарская Е.С., Казанцева И.А., Овсянникова Г.В., Прокофьев А.А. Случай диссеминированного поверхностного актинического порокератоза, осложненного развитием базально-клеточного рака кожи. *Росский журнал кожных и венерических болезней*. 2007;(1):10-13.
Snarskaya ES, Kazantseva IA, Ovsyannikova GV, Prokofiev AA. A case of disseminated superficial actinic porokeratosis complicated by development of basal cell skin cancer. *Russian journal of skin and venereal diseases*. 2007; (1):10-13. (In Russ.).

Поступила в редакцию 31.08.17
Received 31.08.17
Принята к печати 08.04.19
Accepted 08.04.19