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Demographic and Histologic Study of Patients with Perforating Dermatoses: A Seven-Year Retrospective Study

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ABSTRACT

Background: Perforating dermatoses are uncommon skin disorders that are characterized by the extrusion of dermal elements through the epidermis.

To evaluate the demographic, clinical, and histological features of patients with perforating dermatoses.

Methods: This is a seven-year retrospective study, from 2013 to 2019, at Razi Dermatology Hospital, including 100 patients with confirmed perforating dermatoses, aged between 15 and 85 years. Demographics, clinical presentation, associated comorbidities, and histopathological findings were recorded and analyzed using SPSS version 22. The significance level was considered $p < 0.05$.

Results: Our population consisted of 52% (52) females and 48% (48) males, with a mean age of 49.7 years. Diabetes (55%) and CKD (25%) were the most common comorbidities. Perforating folliculitis was diagnosed in 71 patients, while 29 had reactive perforating collagenosis. Histopathological analysis revealed key findings: perforating folliculitis cases displayed dilation of the follicular infundibulum, compact parakeratotic plugs, basophilic debris from inflammatory cells, and collagen bundles perforating the follicular epithelium, accompanied by perifollicular inflammatory infiltration. The characteristic findings in the cases of reactive perforating collagenosis included keratotic plugs within epidermal channels, degenerated collagen bundles in the widened papillary dermis, and neutrophilic scale crusts. Lesions predominantly involved the lower extremities (51%), followed by the trunk (14%), and scalp (8%). These Histopathological patterns were consistent across cases, affirming the diagnostic markers of each condition.

Conclusion: This study emphasizes that perforating dermatoses are strongly associated with systemic conditions such as diabetes (55%) and CKD (25%), thus demanding comprehensive management approaches. The histopathological consistency of the perforating dermatoses not only confirms diagnostic reliability and demographic variations but also suggests the need for further research on potential regional influences. These insights provide a foundation for improving therapeutic strategies and enhancing outcomes for patients with these challenging dermatologic conditions.

Keywords: Histological Characteristics; Demographic Characteristics; Skin Perforating Disorders

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Introduction

Perforating dermatoses represent a distinct group of skin disorders characterized by the extrusion of dermal components through the epidermis, frequently presenting with typical clinical and histological features. These range from diseases such as perforating folliculitis to reactive perforating collagenosis, among others, which may cause patients to experience hazardous skin and systemic manifestations.

According to García-Malinis et al., 2017 acquired perforating dermatoses represent a complex interplay of pathogenesis with local and systemic factors. Their clinicopathological study of 31 cases underlined comprehensive knowledge about the mechanisms of the disease and strategies of treatment, highlighting the importance of accurate diagnosis and management [1]. Similarly, Kestner et al. (2017) have also opined that acquired reactive perforating dermatosis can be considered a subgroup of prurigo nodularis due to the presence of certain overlapping factors related to treatment modality to some extent [2].

Histopathologically, perforating dermatosis (PD) shows the extrusion of dermal material, typically collagen, through the epidermis. This process is characterized by transepidermal elimination, where dermal components are forced into the epidermis, creating a perforation. In cases of acquired reactive perforating collagenosis, there is usually a dense inflammatory infiltrate, including neutrophils, around the perforated areas, along with epidermal hyperplasia and spongiosis. The underlying dermis may show a thickened collagen matrix, and in some cases, there is associated vasculitis. These histological features can help in differential diagnosis and explain the underlying pathology of these diseases. For example, Wang et al. gave insights into the histological patterns in systemic conditions, which may perhaps provide parallels in the study of perforating dermatoses [3].

Although the perforating dermatoses have been adequately described, their prevalence and their clinical correlation in a retrospective setting have not been adequately reviewed concerning the long-term prognosis. This study, therefore, looked at the demographic and histologic data of patients diagnosed with perforating dermatosis over Seven years.

Method

The present retrospective, descriptive study was carried out over 7 years, from 2013 to 2019, at the Razi Dermatology Hospital. It aimed to study the demographic and histological characteristics of patients diagnosed with perforating dermatoses. The study included 100 patients, both men and women, who visited the hospital between 2013 and 2019 and had a confirmed diagnosis of perforating dermatoses supported by histopathology. Of the patients, 52% were female and 48% were male. Data were recorded on standardized forms that included demographic characteristics, clinical presentation, histopathological findings, and maintenance of patient confidentiality. Any male or female who presented with perforating dermatoses in the age group of 15 to 85 years with a conclusive diagnosis supported by histopathology was considered eligible for the study. A subject with a diagnosed dermatological condition that occurred before the onset of recent skin lesions or with incomplete records was rejected.

Since perforating dermatoses are rather rare diseases and their prevalence had not been determined in Iran previously, all patients who visited the hospital during the study period with symptoms that might suggest such conditions were included in our sample size.

The primary outcome variables were histopathological findings from skin biopsies, followed by the categorization into key features such as hyperkeratotic papules and erythematous pustules, and demographic data like age and gender. Other independent variables included the duration of symptoms and the presence of underlying pathological conditions such as diabetes and chronic kidney disease. Descriptive statistics were used as methods of describing the characteristics of the data. All statistical analyses were performed by taking a p-value of 0.05 as the significance level in SPSS version 22 software. The research ahead was an attempt to work under ethical standards by keeping patients' records anonymous and confidential during all steps of the study.

Result

For this study, a sample of 100 male and female patients who attended the facility between the years 2013 and 2019 were chosen. The diagnosed and referred cases of perforating dermatoses were enrolled at Razi Hospital. Thereafter, among the included population, 52 were female (52%) and 48 were male (48%). The age ranged between 15 and 85 years, with a mean age of 49.7 years. The most common comorbidities among the participants were diabetes (55%), chronic kidney disease (25%), and hypertension (27%).

Of the participants, 83% were married and 17% were single. Among the cases diagnosed with perforating dermatosis, 29 were identified as RPC and 7 as perforating folliculitis. Of the patients with RPC, 65% had diabetes and 20% had chronic kidney disease. Among the perforating folliculitis cases, 53% had diabetes and 31% had chronic kidney disease.

Regarding gender in both conditions, there is a higher prevalence in females, though males are also significantly

represented. The mean age was 59.2 and 46.3 years for RPC and PF patients, respectively. Comorbidities such as diabetes and chronic kidney disease are shared by the subjects, with a slight increase in the prevalence of diabetes in RPC patients compared to that in PF patients, at 65% and 53%, respectively. Pruritus and erythema are commonly seen in both conditions; however, RPC patients have a higher incidence of pruritus: 73% versus 37% in PF. The lesions in both conditions commonly appear on the lower extremities, though the upper extremities and scalp may be affected in lower percentages.

The clinical presentation of acquired perforating dermatosis (APD) varied among the patients (Figure 1).

Table 1. Demographics, Clinical Features, and Comorbidities in Patients with Perforating Dermatosis

Variable	RPC (n=29)	PF (n=71)
Gender	45% Male, 55% Female	49% Male, 51% Female
Age (Mean ± SD)	59.2 ± 9.23	46.3 ± 13.6
Previous Smoking (Yes)	17%	30%
Marital Status (Married)	83%	84%
Comorbidities	65% diabetes, 20% chronic kidney disease, 7% hypertension	53% diabetes, 31% chronic kidney disease, 7% hypertension
Symptoms (Pruritus)	73%	37%
Symptoms (Erythema)	73%	51%
Lesion Location (Lower Extremities)	51%	52%
Lesion Location (Upper Extremities)	14%	6%
Lesion Location (Scalp)	8%	5%

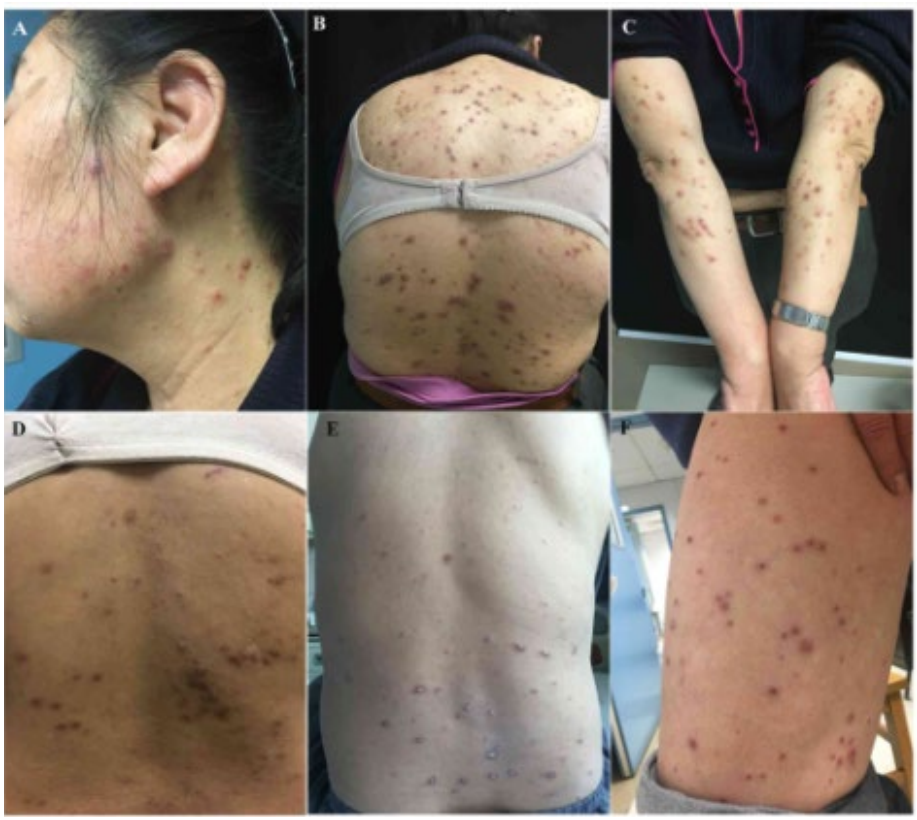

Fig. 1. Presentation of acquired perforating dermatosis: The patient in case 1 exhibited numerous skin lesions accompanied by severe pruritus. (A) There were a few papules on the face; (B) numerous umbilicated papules with central keratotic plugs on the trunk; and (C) a linear arrangement of some papules on the bilateral upper limbs, confirmed as the Koebner phenomenon. (D) The patient in case 2 showed a limited number of papules during the recovery phase of APD, along with several keratotic papules featuring central keratinous plugs on the back. (E) In case 3, the patient had a scattered distribution of well-defined keratotic papules on the back. (F) The patient in case 4 presented with a scattered arrangement of papules and nodules, each featuring a central keratin-filled crater on the trunk. [3]

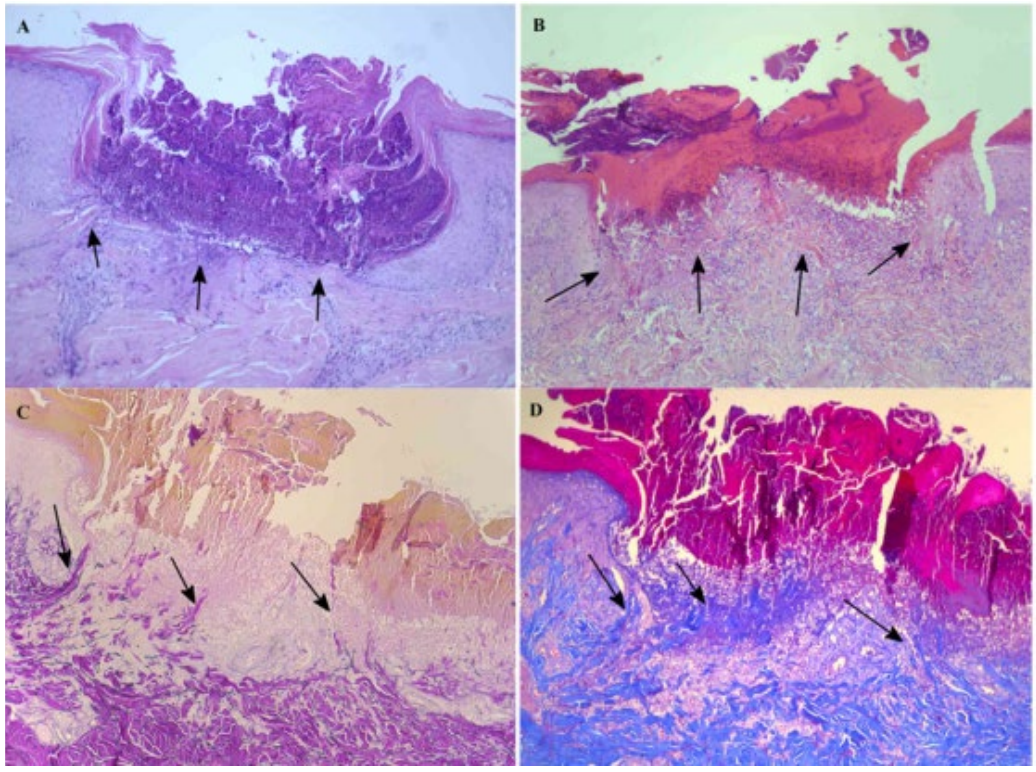

Fig. 2. Biopsies show cup-shaped invagination of the epidermis and sparse fiber bundles extending from the dermis to the epidermis, indicated by the black arrows. (A) Case 1 features several infiltrating inflammatory cells in a patient at an advanced stage of APD. (B) Case 2 presents a few inflammatory cells in a patient who is in the recovery stage. (C) In case 3, there is transepidermal elimination of collagen (red) and elastic fibers (black). (D) Case 4 illustrates perforating collagen fibers (blue) in the patient [3].

Histopathological Findings

In Reactive Perforating Collagenosis (RPC), histopathology reveals epidermal channels filled with keratotic plugs interspersed with parakeratotic cells, along with degenerated collagen fibers and neutrophilic scale crust. The papillary dermis shows widening with degenerated collagen bundles. In Perforating Folliculitis (PF), the follicular infundibulum is dilated and filled with compact orthoparakeratotic cornified cells. Histological findings include degenerated basophilic staining material, perforations through the follicular epithelium, and a perifollicular inflammatory infiltrate consisting of lymphocytes, histiocytes, and neutrophils (Figure 2).

Discussion

In our study, we found that a slight predominance of perforating dermatoses was seen in female patients, 52% versus 48% in males, which was also observed by García-Malinis et al. (2017), who described a similar trend in gender distribution [1]. The mean age of our cohort was 49.7 years, which corresponds with the age bracket presented by Kestner et al. (2017) [2]. In our cohort, patients with RPC were slightly older than those with PF (59.2 vs. 46.3 years), which could explain the prevalence of RPC in more advanced age groups.

The high prevalence of comorbidities in our cohort was dominated by diabetes (55%), which was in concert with the report of García-Malinis et al. (2017), who described a similarly strong association with diabetes [1]. A higher percentage (25%) of our patients had chronic kidney disease compared with such reports as that of Weng et al. (2012), where this condition was associated with perforating dermatoses in hemodialysis patients [4]. This could also represent regional differences in the prevalence of CKD or patient demographics. Furthermore, 27% of our patients were smokers, which agrees with the observations of Wang et al. (2020), who stated that lifestyle factors are involved in the progression of perforating dermatoses [3]. This also reveals that smoking might exacerbate such diseases.

Our findings were therefore in concurrence with those of Garrido et al. (2020) and Kestner et al. (2017), as both RPC and PF had keratotic plugs and degenerated collagen fibers in RPC and dilated follicular infundibula in PF [2,5]. These findings are in concert with the observations made by Patterson (1984) and Kestner et al. (2017), who also stated that the lower extremities

were the most common sites of involvement for both conditions, which they attributed to trauma or vascular insufficiency in these areas [2,6].

Despite similar histopathological findings, the distinction of RPC from PF is not easy because of the presence of some overlapping features. This would mean that both conditions may represent a spectrum of perforating dermatoses, sharing similar pathogenetic mechanisms. Moreover, conditions like Kyrle's disease or EPS also present with similar features and could be included in further studies in order to explore their connection with perforating dermatoses.

In summary, the findings here support established associations between the perforating dermatoses and conditions such as diabetes and CKD; however, geographical variations are important in some comorbidities. Histopathology, with a lot of heterogeneity, has so far proved reliable in its diagnosis; the clinical-pathological overlaps of RPC and PF continue to challenge this demarcation of two nosological units and open research on criteria for both diagnosis and therapies.

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Conflicting Interests

All the authors declare that there is no conflict of interest.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Authors' Contributions

A.E., M.Y., P.N. and A.R. performed the research. Z.A., P.H. and A.K. designed the research study. Z.A. and A.E. supervised the project. A.K., M.Y. and A.R. analyzed the data. P.H. and A.K. wrote the paper.

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