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A comparison of dermoscopic features of pigmented purpuric dermatoses and pigmented purpuric dermatosis–like mycosis fungoides

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Abstract

Introduction: Pigmented purpuric dermatosis–like mycosis fungoides (PPD-MF) is an uncommon clinical presentation of mycosis fungoides characterized by purpuric lesions that may closely mimic pigmented purpuric dermatosis (PPD). This study evaluates dermoscopic features that may help differentiate PPD-MF from PPD.
Methods: This retrospective study assesses the diagnostic utility of dermoscopy in distinguishing PPD from PPD-MF. It included 11 patients with histopathologically confirmed PPD-MF and 19 patients with PPD. Categorical variables were compared using Fisher's exact test.
Results: Curved vessels, straight vessels, serpentine vessels, and curved linear vessels with a terminal dot were significantly more frequent in PPD-MF. In contrast, an orangish-brown background and white lines were significantly more common in PPD.
Conclusions: Dermoscopy may provide useful supportive clues for distinguishing PPD-MF from PPD, particularly through the assessment of vascular morphology and background color. However, because of overlapping clinical and dermoscopic features, dermoscopic findings should be interpreted together with clinicopathological and immunohistochemical evaluation. Further studies with larger sample sizes and follow-up data are warranted to validate these findings.

Keywords: dermatoscopy, dermoscopy, pigmented purpuric dermatoses, pigmented purpuric dermatosis–like mycosis fungoides, purpuric mycosis fungoides

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Introduction

Pigmented purpuric dermatoses (PPD) are a group of chronic inflammatory skin disorders characterized by petechial hemorrhage secondary to capillaritis and typically presenting as asymptomatic or mildly pruritic lesions. Clinically, they appear as erythematous macules on the lower extremities that evolve into golden-brown pigmentation over time due to hemosiderin deposition. PPD shares clinical similarities with various dermatological conditions such as stasis dermatitis, senile purpura, contact dermatitis, vasculitis, and mycosis fungoides (MF), making differential diagnosis challenging (1).

MF may rarely present in a purpuric form mimicking PPD, referred to as pigmented purpuric dermatosis–like mycosis fungoides (PPD-MF). A significant increase in the body surface area affected by purpuric patches, the presence of poikilodermatous changes and pruritus, and disease duration longer than 1 year should raise clinical suspicion of MF (2). This presentation should be distinguished from poikilodermatous MF, which is typically defined by the coexistence of pigmentary alteration, atrophy, and telangiectasia. Although poikilodermatous changes may occasionally be observed in patients with PPD-MF, it is mainly defined by its purpuric, PPD-like appearance rather than by the full poikilodermatous triad.

The combined use of dermoscopy and histopathology allows a comprehensive assessment of MF lesions. The hallmark histopathological feature of MF is epidermotropism, characterized by the presence of atypical T-lymphocytes infiltrating the epidermis. Another supportive finding is the alignment of atypical lymphocytes along the epidermal basal layer. When present, Pautrier microabscesses, well-defined intraepidermal clusters of atypical lymphocytes, are considered highly specific for MF. On the other hand, the histopathology of PPD shows superficial perivascular lymphocyte accumulation, erythrocyte extravasation, and hemosiderin-laden macrophages (1).

Dermoscopy has become an important supportive tool in the evaluation of both inflammatory dermatoses and cutaneous neoplasms, including cutaneous lymphomas (3). In early-stage MF, reported dermoscopic features include a pink to erythematous background, fine short linear vessels, dotted vessels, orangish-yellow areas, white scales, and, in some cases, linear vessels ending in a dot, commonly referred to as spermatozoa-like vessels. Similar vascular findings have also been described in several MF variants, including erythrodermic, folliculotropic, and poikilodermatous MF (4). Nevertheless, data regarding the dermoscopic distinction between PPD and PPD-MF remain limited, despite their considerable clinical overlap (5). Therefore, this study compares the dermoscopic features of PPD and PPD-MF and identifies potential clues that may support their differential diagnosis.

Methods

This retrospective study included 11 patients with PPD-MF and 19 patients with PPD that presented to the Department of Dermatology and Venereology at Ankara University between September 2014 and June 2025. Only patients with histopathologically confirmed diagnoses and adequate dermoscopic images were included.

The diagnosis of PPD-MF was established based on clinicopathological correlation, including compatible clinical presentation, histopathological findings, and immunohistochemical

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evaluation. All cases were reviewed by two experienced dermatopathologists.

Histopathological criteria supporting PPD-MF included epidermotropism of atypical lymphocytes, basal alignment of atypical lymphocytes, variable superficial lymphoid infiltration, and immunophenotypic abnormalities. These abnormalities specifically comprised a CD4/CD8 ratio within the intraepidermal and atypical lymphoid cells that is predominantly skewed in favor of either CD4+ or CD8+ phenotypes, as well as the loss of pan-T-cell markers, particularly CD5 and/or CD7, when present. The thresholds used to determine the loss of expression were 50% for CD5 and 10% for CD7. When available, T cell receptor (TCR) clonality was considered supportive but was not used as a mandatory diagnostic criterion. In contrast, the diagnosis of PPD was supported by superficial perivascular lymphocytic infiltrate, erythrocyte extravasation, and hemosiderin-laden macrophages, without diagnostic features of MF.

Demographic and clinical data were recorded, and dermoscopic images were obtained using FotoFinder ATBM Master (FotoFinder systems, Bad Birnbach, Germany) and DermLite DL4/DL5 (DermLite LLC, Aliso Viejo, California, USA) devices. All images were retrospectively evaluated by three dermatologists, who were blinded to the final clinical and histopathological diagnoses. In cases of disagreement, a final decision was reached by consensus. PPD and PPD-MF cases were compared according to vascular morphology, background color, the presence of a brown pigment network, and white lines. Vascular structures were classified as dotted, clod, circle, curved, straight, serpentine, reticular, and curved linear vessels with a terminal dot. Although this latter pattern is commonly referred to in metaphorical terminology as "spermatozoa-like vessels," we preferred the descriptive term "curved linear vessels with a terminal dot" to enhance clarity and alignment with standardized dermoscopic terminology. Background colors were categorized as pinkish-orange, pinkish-brown, and orangish-brown. Categorical variables were presented as numbers and percentages. Comparisons between the PPD and PPD-MF groups were performed using Fisher's exact test, given the small sample size and categorical structure of the data. A two-sided *p*-value of less than 0.05 was considered statistically significant.

This study was approved by the Ankara University Faculty of Medicine Clinical Research Ethics Committee under approval no. I06-559-25. The patients in this manuscript gave written informed consent for publication of their case details.

Results

Of the 30 patients included in the study, 11 were diagnosed with PPD-MF and 19 with PPD. Among the patients with PPD, lichen aureus was identified in 13 cases, and the remaining six exhibited features consistent with the lichenoid subtype. Other PPD subtypes were not intentionally excluded; however, suitable cases with adequate dermoscopic documentation were not available during the study period.

The PPD-MF group consisted of eight females and three males, for a female predominance of 72.7%, whereas the PPD group included 11 females and eight males (57.9% female). No statistically significant difference in sex distribution was observed between the groups ($p = 0.466$).

Lower extremity involvement was observed in all patients with PPD-MF and in 78.9% of those with PPD. Lesions located on the trunk or upper extremities were present in 54.5% of the PPD-MF group and 26.3% of the PPD group. The differences in lesion distribution between the groups were not statistically significant for lower extremity involvement or trunk / upper extremity involvement ($p = 0.268$ and $p = 0.238$, respectively).

The clinical data and detailed dermoscopic findings of the patients are summarized in Table 1.

Dermoscopic analysis revealed notable differences in vascular morphology. Curved vessels were present in 54.5% of PPD-MF cases and absent in PPD cases ($p < 0.001$). Likewise, straight vessels (36.4% vs. 0.0%; $p = 0.012$), serpentine vessels (54.5% vs. 15.8%;

Table 1 | **Clinical data and dermoscopic findings of patients with pigmented purpuric dermatosis and pigmented purpuric dermatosis–like mycosis fungoides.**

	PPD, *n* (%) *N* = 19	PPD-MF, *n* (%) *N* = 11	*p*-value
Sex			
Female	11 (57.9)	8 (72.7)	0.466
Male	8 (42.1)	3 (27.3)	
Localization			
Lower limb	15 (78.9)	11 (100.0)	0.268
Upper limb / trunk	5 (26.3)	6 (54.5)	0.238
Vascular structures			
Dotted vessels	15 (78.9)	8 (72.7)	1.000
Clod vessels	15 (78.9)	9 (81.8)	1.000
Linear vessels			
– Circle vessels	12 (63.2)	6 (54.5)	0.712
– Curved vessels	0 (0.0)	6 (54.5)	< 0.001
– Straight vessels	0 (0.0)	4 (36.4)	0.012
– Serpentine vessels	3 (15.8)	6 (54.5)	0.042
– Curved linear vessels with terminal dot (spermatozoa-like vessels)	0 (0.0)	5 (45.5)	0.003
– Reticular vessels	2 (10.5)	4 (36.4)	0.156
Background color			
Pinkish-orange	9 (47.4)	8 (72.7)	0.259
Pinkish-brown	1 (5.3)	2 (18.2)	0.537
Orangish-brown	10 (52.6)	1 (9.1)	0.023
Other features			
Brown pigment network	8 (42.1)	1 (9.1)	0.100
White lines	7 (36.8)	0 (0.0)	0.029

PPD = pigmented purpuric dermatosis, PPD-MF = pigmented purpuric dermatosis–like mycosis fungoides.

$p = 0.042$), and curved linear vessels with a terminal dot (45.5% vs. 0.0%; $p = 0.003$) were significantly more common in PPD-MF. In contrast, circle, dotted, clod, and reticular vessels were observed in 54.5%, 72.7%, 81.8%, and 36.4% of PPD-MF cases, respectively, and in 63.2%, 78.9%, 78.9%, and 10.5% of PPD cases, with no statistically significant differences between the groups ($p = 0.712$, $p = 1.000$, $p = 1.000$, and $p = 0.156$, respectively).

In terms of background color, an orangish-brown background was significantly more frequent in PPD cases than in PPD-MF cases (52.6% vs. 9.1%; $p = 0.023$). Although a pinkish-orange background was more commonly observed in PPD-MF (72.7% vs. 47.4%), this difference did not reach statistical significance ($p = 0.259$).

White lines were significantly more frequent in PPD and were not observed in any PPD-MF cases (36.8% vs. 0.0%; $p = 0.029$). Similarly, a brown pigment network was more frequently observed in PPD than in PPD-MF (42.1% vs. 9.1%), although this difference was not statistically significant ($p = 0.100$).

The clinical and dermoscopic features of PPD and PPD-MF are illustrated in Figures 1 and 2, respectively, highlighting the key morphological patterns that may aid in their differentiation. Representative histopathological and immunohistochemical findings supporting the diagnoses of PPD and PPD-MF are shown in Figures 3 and 4, respectively.

Discussion

Previous dermoscopic studies have shown that MF displays a broad spectrum of findings depending on disease stage and clinical variant. Classic patch-stage MF is dermoscopically characterized by a pink-to-erythematous background, focal orange areas, patchy whitish scales, and short linear and dotted vessels (4). Lallas et al. and subsequent MF-focused studies have highlighted a distinctive vascular structure, known as spermatozoa-like vessels, formed by the coexistence of a dotted vessel and a short linear or curved vessel (4, 6). Plaque-stage MF may show clustered dotted vessels, whereas tumoral MF may reveal peripheral linear vessels with branches, ulceration, and red globules separated by white lines. Variant-specific dermoscopic clues have also been reported: folliculotropic MF is mainly associated with loss of hairs, dilated follicles, and follicular plugs; erythrodermic MF with linear or dotted vessels, patchy white scales, and focal orange structureless areas; and poikilodermatous MF with focal white and brown structureless areas forming a checkerboard pattern, white patchy scales, and brown reticular lines (7–9). Within this broader dermoscopic spectrum of MF, our PPD-MF cases showed a predominance of vascular structures, including curved, straight, serpentine, and curved linear vessels with a terminal dot. These findings suggest that PPD-MF may retain MF-associated vascular clues despite its clinical resemblance to PPD.

Nasimi et al. analyzed the dermoscopic features of PPD and purpuric MF and found that fine short linear vessels and spermatozoa-like structures were more common in PPD-MF lesions, whereas PPD lesions were characterized by erythematous globules with a dull red background and reticular pigmentation (3). In our cohort, serpentine and curved vessels, alongside straight and curved linear vessels with a terminal dot, emerged as distinguishing features of PPD-MF.

The dermoscopic findings observed in our PPD group were largely consistent with previous studies. Ozkaya et al. investigated the frequency of specific dermoscopic findings in 32 PPD patients. Coppery-red pigmentation was the most common finding, followed by red globules and dots, brown dots, and a reticular network (10). Similarly, in a retrospective review of 60 biopsy-proven PPD cases,

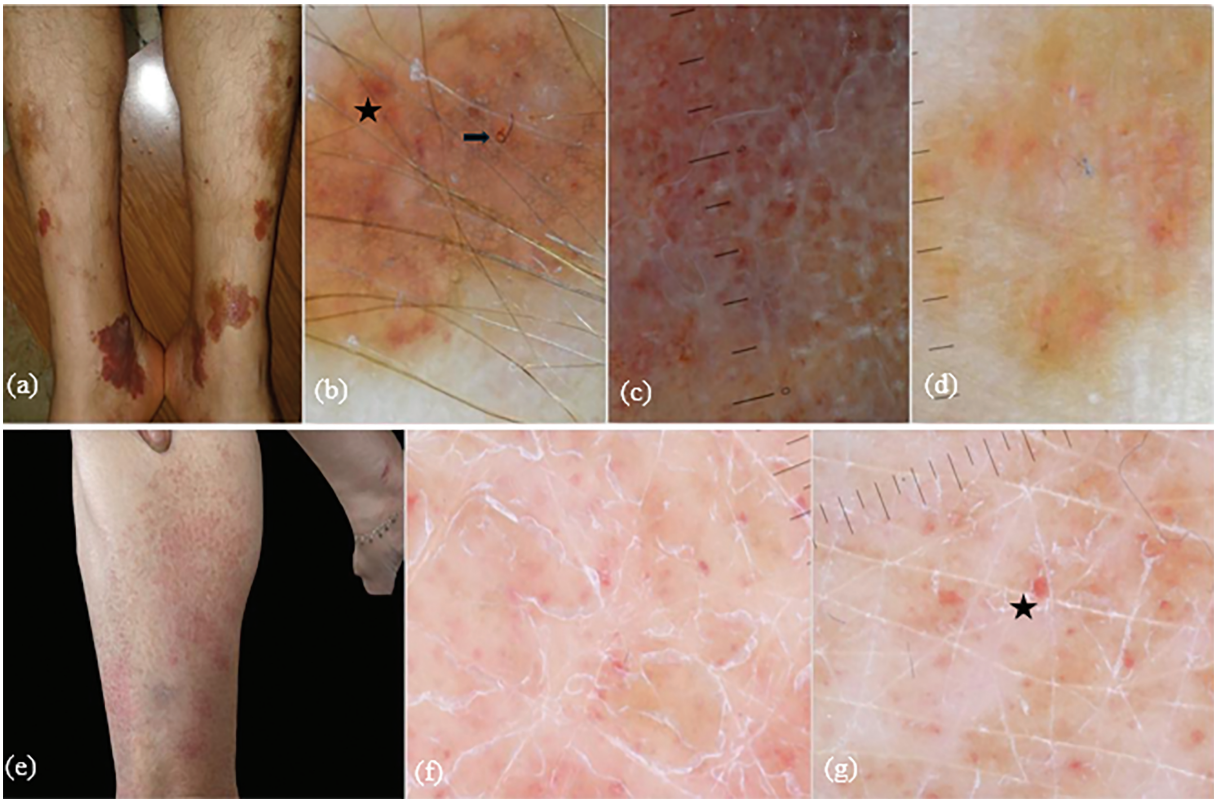


Figure 1 | a) Clinical presentation of pigmented purpuric dermatosis (PPD) characterized by coppery-red plaques distributed bilaterally on the lower extremities, b) dermoscopic examination reveals a brown pigment network, along with circle (⇢) and clod (✱) vessels, c) white lines and a d) pink-orange background are also seen in separate lesions from the same patient, e) clinical presentation of a patient with PPD, f–g) corresponding dermoscopic findings show clod and dotted vessels.

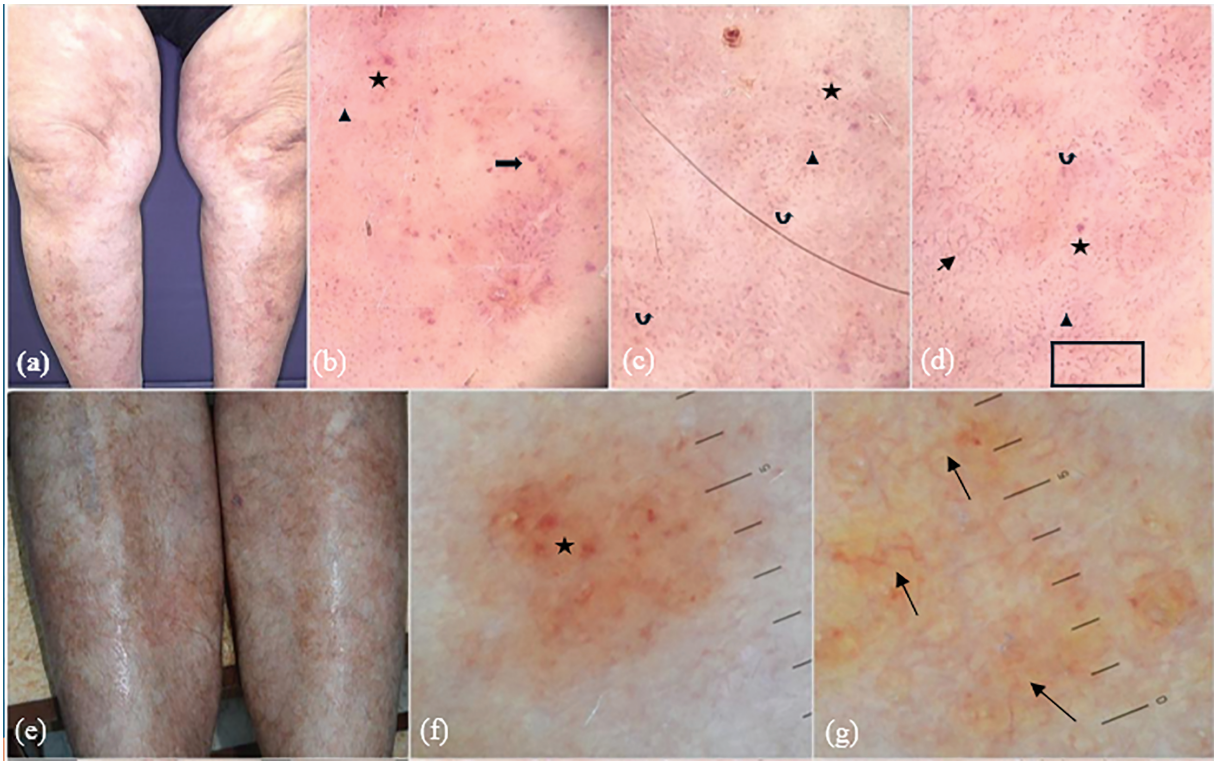


Figure 2 | a) Clinical presentation of pigmented purpuric dermatosis–like mycosis fungoides (PPD-MF), presenting with purpuric macules, b–d) dermoscopic examination reveals a pinkish-orange background with clod (★), dotted (▲), circle (⇢), curved (↺), and straight (↗) vessels and curved linear vessels with a terminal dot (spermatozoa-like vessels, □) highlighting the polymorphous vascular pattern of PPD-MF, e) Clinical presentation of a patient with PPD-MF, f–g) although clod vessels on a pinkish-orange background closely resemble PPD, the presence of a reticular vascular pattern (↖) raised clinical suspicion of PPD-MF, guiding the decision to perform a confirmatory biopsy.

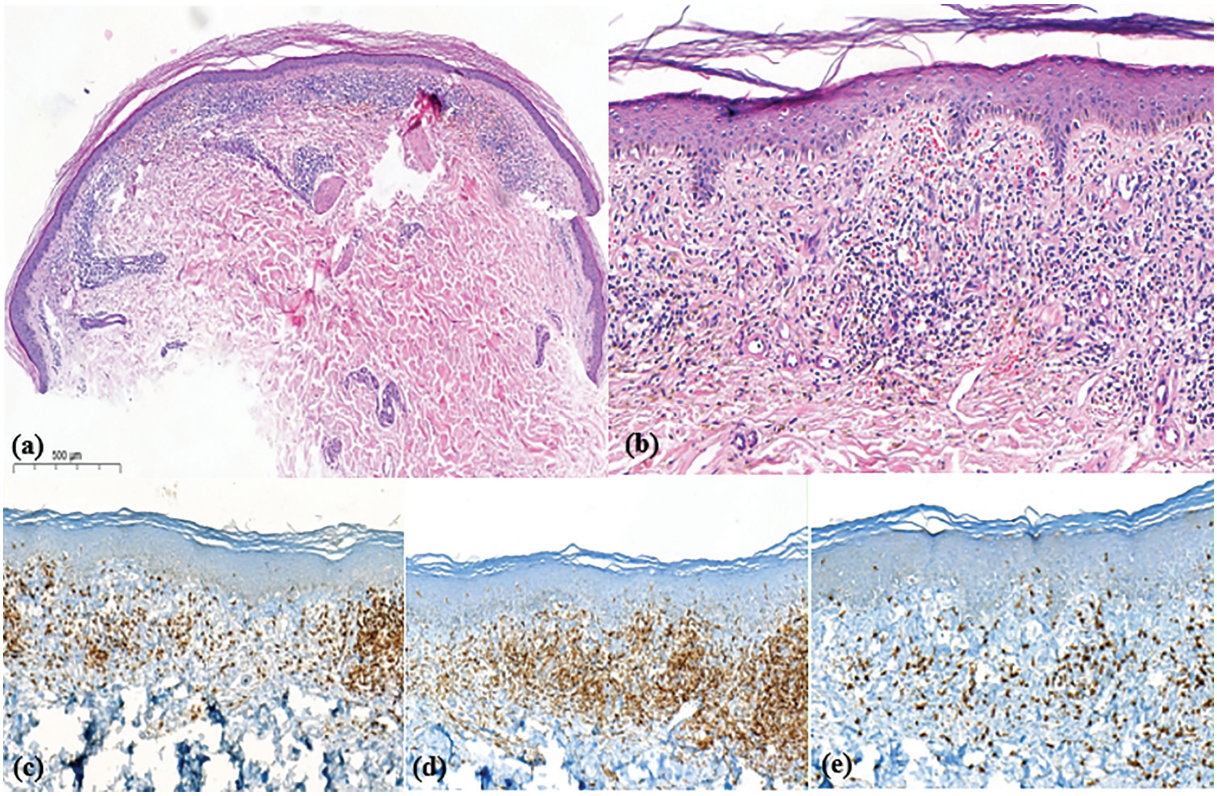


Figure 3 | Histopathological and immunohistochemical findings from a patient with pigmented purpuric dermatosis: a–b) in the epidermis, melanocytic proliferation is evident at the basal layer. Scattered, small-sized lymphocytes are present in limited numbers. In the papillary dermis, prominent erythrocyte extravasation and brown pigment accumulation consistent with hemosiderin deposition are observed (hematoxylin and eosin, ×13), c–e) immunohistochemical staining with CD3, CD4, and CD8 reveals reactive T lymphocytes dispersed within the epidermis and forming clusters in the papillary dermis (CD3 ×10.1, CD4 ×9.6, CD8 ×13.4).

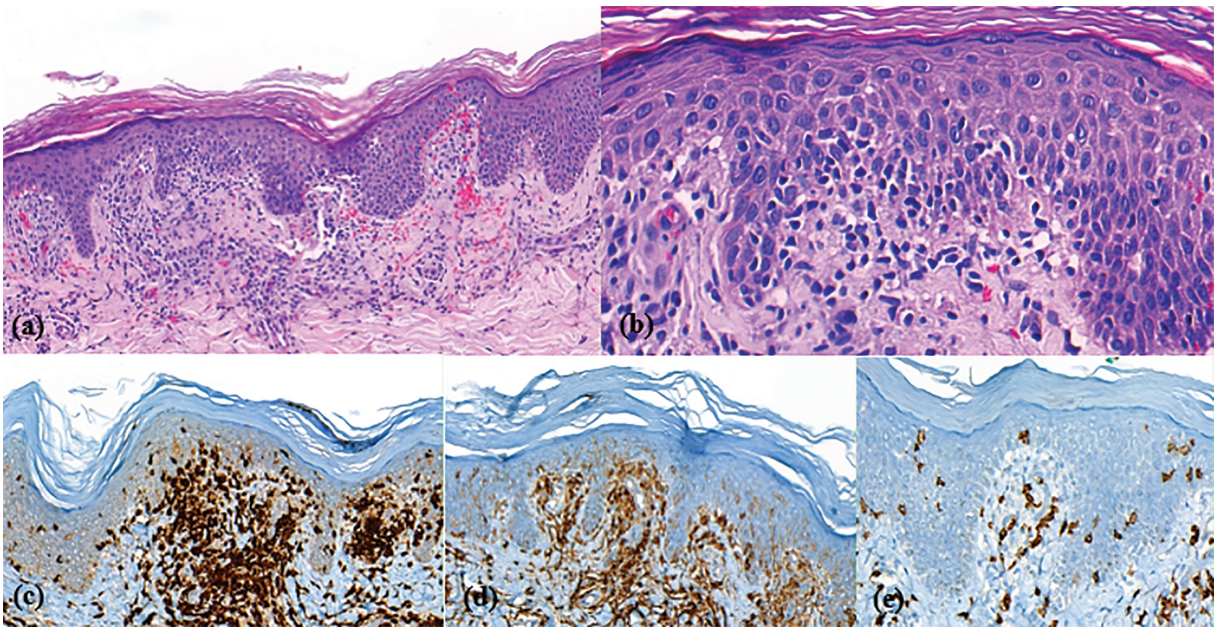


Figure 4 | Histopathological and immunohistochemical findings from a patient with pigmented purpuric dermatosis–like mycosis fungoides: a–b) the epidermis demonstrates irregular psoriasiform hyperplasia, with atypical lymphocytes exhibiting hyperchromatic, cerebriform nuclei infiltrating the basal layer. Prominent erythrocyte extravasation is also noted in the papillary dermis (hematoxylin and eosin, ×12.8, ×41.2), c–e) immunohistochemical analysis shows that the atypical lymphocytes are positive for CD3 and CD4, but negative for CD8, supporting the diagnosis of a helper T-cell phenotype (CD3 ×18.9, CD4 ×19, CD8 ×27.5).

Kim et al. found red globules and dots, brownish patches, coppery-red pigmentation, annular or comma-like vessels, and a lentigine-like reticular pigmented network as the predominant dermoscopic findings (11). These observations are consistent with our finding that an orangish-brown background and brown pigment network were more frequently observed in PPD than in PPD-MF. Furthermore, white lines were observed in over one-third of PPD cases in our study, but were absent in all PPD-MF patients, suggesting that this feature may serve as an additional supportive dermoscopic clue favoring PPD.

The relationship between PPD-MF and poikilodermatous MF deserves particular consideration. These entities may show clinical overlap; however, poikilodermatous MF is classically characterized by the triad of pigmentary change including mottled hyper- and hypopigmentation, atrophy, and telangiectasia, most often involving the trunk and major flexural areas. Some authors define poikilodermatous MF as cases in which poikilodermatous lesions predominate, involving more than 50% of the lesions, thereby separating it from classic MF with only focal poikilodermatous change (12, 13). In contrast, PPD-MF is primarily defined by persistent purpuric or hemosiderin-associated patches that clinically mimic PPD.

This study contributes to the growing body of knowledge regarding the dermoscopic features of PPD and PPD-MF. To our knowledge, this is among the first studies to directly compare dermoscopic findings between histopathologically confirmed PPD and PPD-MF within the same cohort, rather than describing purpuric MF findings in isolation; this comparative design allowed identification of vascular structures that specifically discriminate PPD-MF from PPD—namely, curved, straight, serpentine, and curved linear vessels with a terminal dot—rather than simply cataloguing MF-associated vascular patterns in general.

Histopathological confirmation remains mandatory for suspected MF; however, dermoscopy may help guide biopsy decisions in clinically ambiguous purpuric lesions. In routine practice, not every lesion clinically suggestive of PPD undergoes biopsy. Our findings suggest that the presence of a prominent vascular pattern—particularly curved, straight, serpentine, or curved linear vessels with a terminal dot—should lower the threshold for biopsy to exclude PPD-MF.

The main strengths of this study include the use of histopathologically confirmed cases, dermatopathological review by two experienced dermatopathologists, blinded dermoscopic evaluation by three dermatologists, and the direct comparative assessment of PPD and PPD-MF. However, several limitations should be acknowledged. First, the study was retrospective and included a relatively small number of patients, particularly in the PPD-MF group. Second, dermoscopic documentation was not available for all patients with PPD seen during the study period, and the PPD group included only lichen aureus and lichenoid PPD, limiting the generalizability of the findings to other PPD subtypes. Finally, TCR clonality analysis was not available for all patients. Although TCR gene rearrangement studies may provide useful ancillary evidence in equivocal cases, they are not mandatory for the diagnosis of MF and should be interpreted cautiously. False-negative results may occur in early-stage MF, whereas clonal T-cell populations may occasionally be detected in reactive inflammatory dermatoses (14, 15). Therefore, the diagnosis in our cohort primarily relied on clinicopathological correlation, histopathology, and immunohistochemistry.

Further studies with larger cohorts, inclusion of broader PPD subtypes, standardized molecular assessment, and longitudinal follow-up are warranted to validate these observations.

Conclusions

PPD and PPD-MF may show substantial clinical overlap, but their prognosis and management differ markedly. This study suggests that dermoscopy can provide practical clues for distinguishing these entities, particularly through vascular morphology, background color, and white lines. Although dermoscopy cannot replace histopathological confirmation, recognition of MF-associated vascular patterns may help clinicians lower the threshold for biopsy and avoid delayed diagnosis of PPD-MF.

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