

Dermoscopic Features of Cutaneous Leishmaniasis Lesions

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Abstract

Objective: This study aimed at determining the dermoscopic characteristics of cutaneous leishmaniasis (CL) and comparing these characteristics to the previous results. **Materials and Methods:** The prospective study included a total of 225 lesions from 69 patients with the ages between 1 and 70 years who were admitted to our dermatology clinic between March 1, 2016, and August 1, 2016, diagnosed with CL using smears of skin lesions, and did not receive any previous antileishmanial treatment. **Results:** When the lesions were dermoscopically examined for their general characteristics, the most common findings were erythema (100%), teardrop-like structures (59.1%), and hyperkeratosis (53.3%). The most common vascular structures in the lesions were linear vessels (50.2%), dotted vessels (39.6%), and hairpin-like vessels (32.9%). **Conclusion:** Our data were comparable to those of the previous studies in literature. Although there is no specific dermoscopic feature specific to CL, we presume that dermoscopic findings may contribute to differential diagnosis in the presence of clinically similar cutaneous lesions.

Keywords: Cutaneous leishmaniasis, dermoscopy, linear vessels, teardrop-like structures

INTRODUCTION

Leishmaniasis is a vector-borne, common infection affecting 12 millions of individuals in 98 countries including Turkey, with >350 million people being at risk. Cutaneous leishmaniasis (CL) is the most common form of the disease.^[1-4] The definitive diagnosis of CL is made by laboratory methods including microscopic examination of the Giemsa-stained smears, histopathologic examination, culture, or polymerase chain reaction.^[5-9] Dermoscopy is a noninvasive *in vivo* diagnostic technique that facilitates the examination of epidermis and superficial dermis. Today, dermoscopy is highly important for the diagnosis and treatment monitorization in almost all fields of dermatology including infectious and inflammatory dermatoses, mainly early diagnosis of melanoma.^[10-14] This study aimed at determining the dermoscopic characteristics of CL, comparing these characteristics to the previously published studies, and demonstrating whether dermoscopy is a valuable technique for the diagnosis of CL.

MATERIALS AND METHODS

The prospective study included a total of 225 lesions from 69 patients with the ages between 1 and 70 years who were

admitted to our dermatology clinic between March 1, 2016, and August 1, 2016, diagnosed with CL using smears of skin lesions, and did not receive any previous antileishmanial treatment.

Dermoscopic findings and clinical characteristics of the lesion were noted before initiating antileishmanial treatment in all patients. All the included lesions were individually examined and assessed. Macroscopic and dermoscopic images were taken. DermLite photo equipment (3Gen Inc. 31521 Rancho Viejo Road, Suite 104 San Juan Capistrano, CA 92675 USA) was used as the dermoscope, (Canon inc, shimomaruko, 3-chumo, Ohta-ku, Tokyo, Japan) was used as the camera, and Canon EF 50 mm f/1.8 II was used as the lens. All information was noted. At least three dermoscopic images were taken from each lesion. While taking images by the dermoscope, lesions were wiped using 60% alcohol to obtain more quality images, to view deeper regions, and to prevent light reflection. Minimal pressure was applied using the dermoscope to protect the main vascular structure and prevent vascular collapse. The examination was performed after all patients and lesions were collected.

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Based on the dermoscopic appearance of the lesions, features including erythema, hyperkeratosis, crust, teardrop-like structures, milia-like cyst, white-starburst pattern, ulceration, scar, and orange areas were assessed. Vascular structures in the lesions were assessed based on morphology including dotted vessels, hairpin-like vessels, linear vessels, comma-like vessels, and arborizing vessels.

Written consent was taken from the patients. The study was approved by the local ethics committee of Faculty of Medicine, Harran University (date: March 01, 2016, number: 8).

Statistical analysis

Statistical analyses were performed using the SPSS 15.0 for Windows (SPSS Inc., Chicago, IL, USA) package software. Percentage was used for descriptive statistics, and Chi-square test was used for pair-wise analyses. $P < 0.05$ was considered to be statistically significant.

RESULTS

Out of 69 patients included in the study, 32 (46.4%) were female and 37 (53.6%) were male, with a total of 225 lesions being examined. The patients' ages were between 1 and 70 years. Thirty-four (49.2%) patients were symptomatic. The number of patients with itching was 27 (39.1%), with pain was 6 (8.7%), and with burning sensation was 2 (3%). Ninety-five lesions (42.2%) were on the face, 7 (3.1%) were on the neck, 98 (42.7%) were on the upper extremity, and 25 (11.1%) were on the lower extremity [Table 1]. One hundred and forty lesions (62.2%) were papules, 54 (24%) were plaques, 23 (10.2%) were nodules, and 8 (3.6%) were noduloulcerative.

Table 1: Anatomic locations of cutaneous leishmaniasis lesions (n=225)

Location	Lesions, n (%)
Face	95 (42.2)
Forehead	12 (5.3)
Periorbital region	18 (8)
Nose	9 (4)
Cheek	42 (18.7)
Perioral region	10 (4.4)
Ear	2 (0.9)
Chin	2 (0.9)
Neck	7 (3.1)
Anterior side	5 (2.2)
Posterior side	2 (0.9)
Upper extremities	98 (42.7)
Arm	11 (4.9)
Forearm	61 (27.1)
Hand	26 (11.6)
Lower extremities	25 (11.1)
Thigh	2 (0.9)
Leg	11 (4.9)
Foot	12 (5.3)
Total	225

When the lesions were dermoscopically examined for their general characteristics, the most common findings were erythema (100%), teardrop-like structures (59.1%), and hyperkeratosis (53.3%), and the least common findings were scar (8.9%) and ulceration (3.5%). The most common vascular structures in the lesions were linear vessels (50.2%), dotted vessels (39.6%), and hairpin-like vessels (32.9%) [Table 2 and Figures 1-5].

When dermoscopic characteristics were assessed by body regions, the most common characteristics were teardrop-like structures (71.7%), linear vessels (58.7%), and arborizing vessels (48.9%) on the face; teardrop-like structures (85.6%) and dotted vessels (71.4%) on the neck; dotted vessels (51.0%), white-starburst pattern (46.9%), and teardrop-like structures (44.8%) on the upper extremities; and teardrop-like structures (62.5%) and dotted vessels (58.3%) on the lower extremities [Table 3 and Figures 1-5].

When dermoscopic characteristics were assessed by lesion types, erythema was the most common finding for all lesion types. Other most common findings were teardrop-like structures and linear vessels in papular lesions; hyperkeratosis and teardrop-like structures in plaque lesions; crust, hyperkeratosis, teardrop-like structures, and pustules in nodular lesions; and teardrop-like structures and linear vessels in noduloulcerative lesions [Table 4 and Figures 1-5].

DISCUSSION

There are four previous studies investigating the dermoscopic characteristics of CL.^[15-18] First, Llambrich *et al.* assessed

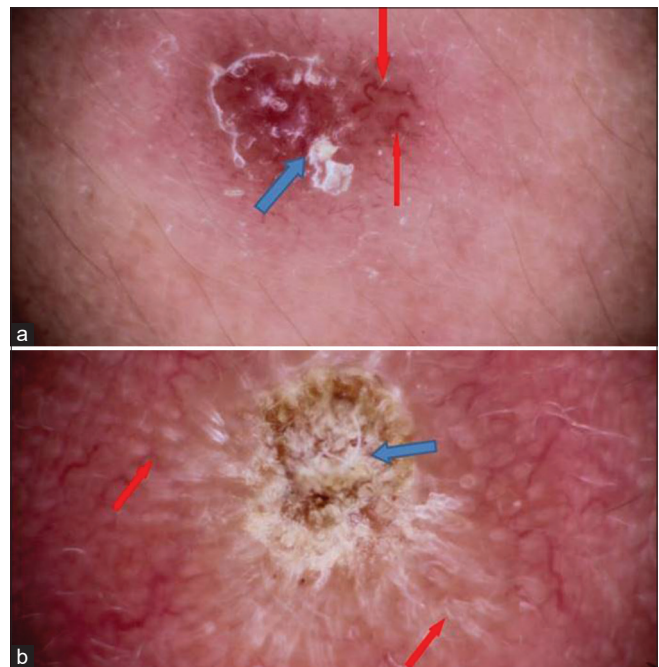


Figure 1: (a) At the center of the lesion, there are crusts and hyperkeratosis (blue arrow), and in the periphery, there are reticular branching and linear vessels (red arrow). (b) Crust and hyperkeratosis (blue arrow) at the center of the lesion; in the periphery, tear-shaped structures (red arrow) with reticular branching and some with targetoid appearance are seen

Table 2: Dermoscopic features of cutaneous leishmaniasis

Dermoscopic features	Study				
	Our study (Turkey) (n=225), n (%)	Yücel et al. ^[15] (Turkey) (n=145), n (%)	Ayhan et al. ^[16] (Turkey) (n=144), n (%)	Taheri et al. ^[17] (Iran) (n=144), n (%)	Llambrich et al. ^[18] (Spain) (n=26), n (%)
General features					
Erythema	225 (100)	145 (100)	127 (100)	118 (81.9)	26 (100)
Hyperkeratosis	120 (53.3)	NR	19 (15.0)	48 (33.3)	13 (50)
Crust	79 (35.1)	51 (35.2)	89 (70.1)	NR	NR
Ulceration	8 (3.5)	51 (35.2)	56 (44.1)	85 (59)	12 (46)
Teardrop-like structures	133 (59.1)	58 (40)	54 (42.5)	60 (41.7)	14 (53)
Milia-like cyst	60 (26.7)	NR	20 (15.7)	7 (4.9)	NR
Orange areas	76 (33.8)	19 (13.1)	20 (15.7)	63 (43.8)	NR
White-starburst pattern	76 (33.8)	27 (18.6)	11 (8.6)	87 (60.4)	10 (38)
Pustules	25 (11.1)	NR	11 (8.6)	NR	NR
Scar	20 (8.9)	NR	22 (17.3)	NR	NR
Perilesional hypopigmented halo	NE	4 (2.8)	NR	NR	NR
Vascular features					
Hairpin-like vessels	74 (32.9)	25 (17.2)	50 (39.4)	54 (37.5)	5 (19)
Arborizing vessels	70 (31.1)	53 (36.6)	49 (38.6)	15 (10.4)	3 (11)
Linear vessels	113 (50.2)	78 (53.8)	33 (26.0)	44 (30.6)	15 (57)
Dotted vessels	89 (39.6)	23 (15.9)	31 (24.4)	88 (61.1)	14 (53)
Comma-like vessels	49 (21.8)	6 (4.1)	25 (19.7)	43 (29.9)	19 (73)
Crown-like vessels	NE	NR	2 (1.6)	NR	NR
Strawberry pattern	NE	NR	2 (1.6)	NR	NR

NE: Not evaluated, NR: Not reported

Table 3: Results of dermoscopic features by localization in cutaneous leishmaniasis

	Face		Neck		Upper extremities		Lower extremities	
	n (%)	P	n (%)	P	n (%)	P	n (%)	P
Teardrop-like structures	66 (71.7)	0.001	6 (85.6)	0.146	43 (44.8)	0.000	15 (62.5)	0.721
Milia-like cyst	27 (29.3)	0.449	3 (42.9)	0.325	24 (25)	0.626	5 (20.8)	0.494
White-starburst pattern	19 (20.7)	0.001	4 (57.1)	0.184	45 (46.9)	0.000	6 (25)	0.336
Hairpin-like vessels	16 (17.4)	0.000	4 (57.1)	0.165	42 (43.8)	0.003	9 (37.5)	0.611
Arborizing vessels	45 (48.9)	0.000	3 (42.9)	0.789	12 (12.5)	0.000	8 (33.3)	0.804
Linear vessels	54 (58.7)	0.034	3 (42.9)	0.990	40 (41.7)	0.027	10 (41.7)	0.375
Dotted vessels	19 (20.7)	0.000	5 (71.4)	0.174	49 (51.0)	0.002	14 (58.3)	0.047
Comma-like vessels	22 (23.9)	0.519	4 (57.1)	0.021	13 (13.5)	0.010	8 (33.3)	0.147

26 lesions of 25 CL patients using dermoscopy and observed teardrop-like structures in 53%.^[18] In their study, Ayhan *et al.* detected teardrop-like structures in 42.5% of the lesions, and teardrop-like structures were detected only in lesions located on the face and the posterior and lateral sides of the neck, however, nowhere else on the body.^[16] In their study, Yücel *et al.* observed teardrop-like structures in 40% of the lesions, and these structures were most frequently observed in nodular lesions.^[15] Teardrop-like structures were observed in 59.1% of the lesions in our study. These structures were particularly observed in nonchronic, crustless, new papular lesions (60%, $P = 0.728$).

Histopathologically, teardrop-like structures were considered to be follicular fillings plugged with keratin formed due to pressure on the hair follicle from the sides.^[15] Keratin-plugged

follicular fillings can also be seen in nonpigmented actinic keratosis, which lead to a strawberry pattern.^[19] In the strawberry pattern in nonpigmented actinic keratosis, keratin plugs are not inside the structure but around the pseudoweb with a large erythema. No ulcer or crust is found at the center.^[19,20] Differences like this may help with the dermoscopic differential diagnosis of CL.

White starburst-like patterns were first described by Llambrich *et al.* in CL lesions and were thought to be caused by parakeratotic hyperkeratosis. This finding was found in 38% of the lesions diagnosed with CL.^[18] In their study, Taheri *et al.* detected this finding in 60.4% of the lesions, mainly in nodular lesions on the upper extremities.^[17] In their study, Yücel *et al.* detected this finding in 19% of the lesions, especially in noduloulcerative lesions.^[15] In our

study, white starburst-like patterns were detected in 33.8% of the lesions, most commonly in papular lesions on the neck. As white starburst-like patterns were not detected in dermatological lesions previously, it can be considered

an important criterion for the dermoscopic assessment of CL lesions.

Arborizing vessels were first found to be useful for the diagnosis of basal-cell carcinoma (BCC) in 1990.^[21] In their study, Ayhan *et al.* observed arborizing vessels in 38.6% of the

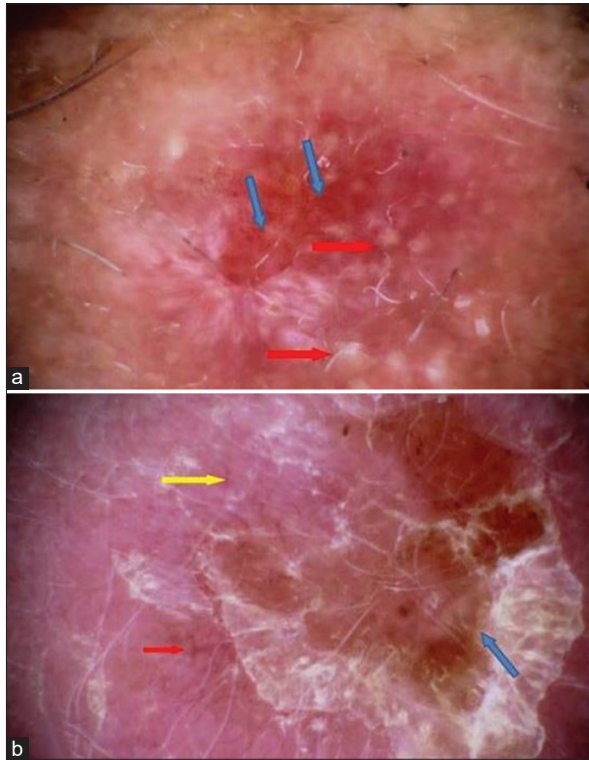


Figure 2: (a) At the center of the lesion, there are ulcer, scar areas, and dotted vessels (blue arrow); in the periphery, there are some ellipse or round tear structures (red arrow). (b) At the center of the lesion, there are crusts and hyperkeratosis (blue arrow), and in the periphery, there are reticular branching (red arrow) and linear vessels (yellow arrow)

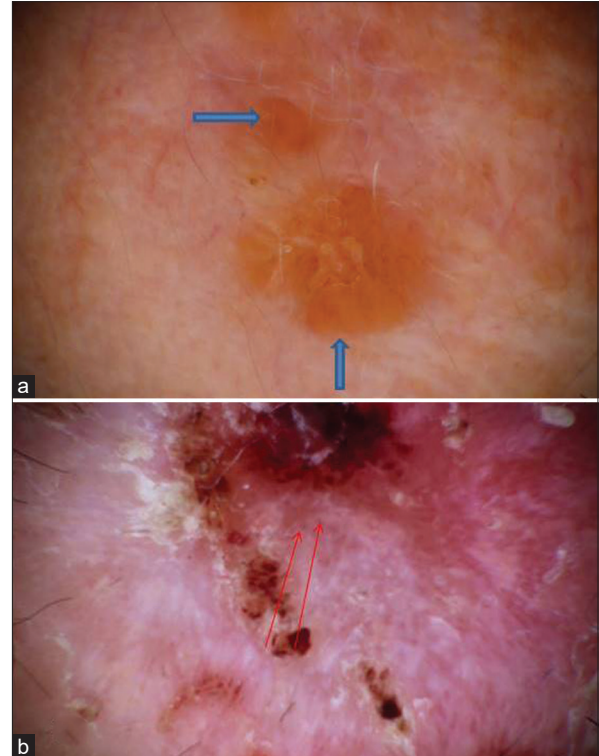


Figure 3: (a) The dermoscopic examination of the lesion shows orange areas (blue arrow). (b) At the center of the lesion, dotted vessels (red arrow) are seen

Table 4: Results of dermoscopic features by type of lesion in cutaneous leishmaniasis

Dermoscopic features	Papules		Plaques		Nodules	
	n (%)	P	n (%)	P	n (%)	P
General features						
Erythema	140 (100)	0.000	54 (100)	0.000	23 (100)	0.000
Hyperkeratosis	59 (42.1)	0.000	45 (83.3)	0.000	12 (52.2)	0.936
Crust	42 (30.0)	0.039	10 (18.5)	0.003	22 (95.7)	0.000
Ulceration	1 (0.7)	0.001	NE	NE	1 (4.3)	0.928
Teardrop-like structures	84 (60.0)	0.728	33 (61.1)	0.732	11 (47.8)	0.245
Milia-like cyst	29 (20.7)	0.010	18 (33.3)	0.204	9 (39.1)	0.154
Orange areas	39 (27.9)	0.016	23 (42.6)	0.116	8 (34.8)	0.914
White-starburst pattern	57 (40.7)	0.005	10 (18.5)	0.007	7 (30.4)	0.721
Pustules	6 (4.3)	0.000	5 (9.3)	0.804	11 (47.8)	0.000
Scar	2 (1.4)	0.000	10 (18.5)	0.004	5 (21.7)	0.058
Vascular features						
Hairpin-like vessels	48 (34.3)	0.567	12 (22.2)	0.056	11 (47.8)	0.108
Arborizing vessels	38 (27.1)	0.099	20 (37.0)	0.281	9 (39.1)	0.381
Linear vessels	71 (50.7)	0.850	28 (51.9)	0.784	10 (43.5)	0.495
Dotted vessels	51 (36.4)	0.218	25 (46.3)	0.245	9 (39.1)	0.965
Comma-like vessels	32 (22.9)	0.615	14 (25.9)	0.397	2 (8.7)	0.109

NE: Not evaluated

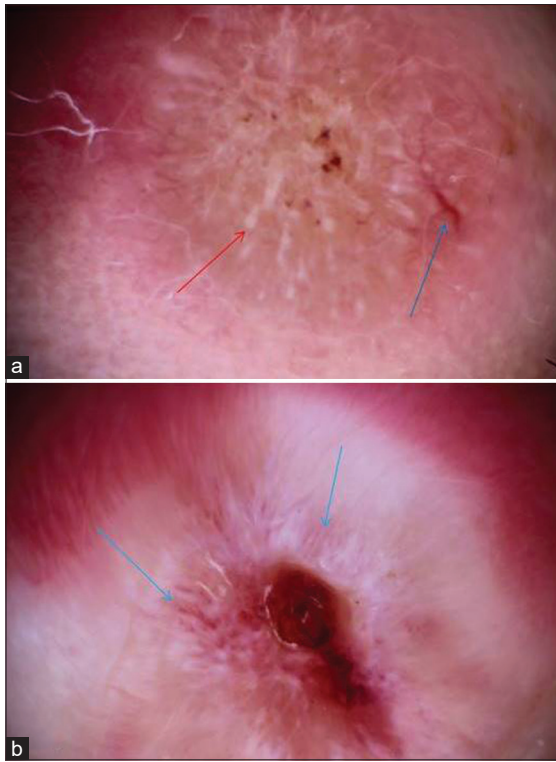


Figure 4: (a) The dermoscopic examination of the lesion shows arborizing vessels (blue arrow) and milia-like cysts (red arrow). (b) The dermoscopic examination of the lesion shows hairpin-like vessels (blue arrow)

patients diagnosed with CL, most commonly in lesions on the face.^[16] In their study, Yücel *et al.* observed arborizing vessels in 36.6% of the lesions, most commonly in papular lesions.^[15] In our study, arborizing vessels were observed in 31.1% of all patients and in 27.1% of papular lesions ($P = 0.099$), with most of these lesions (48.9%) being placed on the face ($P = 0.000$). The presence of arborizing vessels and follicular fillings indicates CL diagnosis.

Hairpin-like vessels are mostly seen in seborrheic keratosis, keratoacanthoma (KA), and nonmelanocytic tumors such as squamous cell carcinoma (SCC), usually accompanied by a white halo surrounding the lesion.^[22-24] Hairpin-like vessels were detected in 19% of CL patients in the study by Llambrich *et al.*^[18] and in 17.2% of the cases in the study by Yücel *et al.*^[15] These vessels were commonly observed in lesions on the lower extremities in both studies.^[15,18] Hairpin-like vessels were observed in 37.5% and 39.4% of the lesions in the studies by Taheri *et al.* and Ayhan *et al.*, respectively. These vessels were commonly detected in lesions on the upper extremities.^[16,17] Hairpin-like vessels were detected in 32.9% of the lesions in our study. In our study, hairpin-like vessels were more common in nodular lesions. Teardrop-like structures existing in the absence of white irregular area, white halo, and central keratin plug were more commonly observed at the center; being observed less commonly and found in larger ulcers, hairpin-like vessels were detected more in the lesions on the neck. These might help in the differential diagnosis of KA and SCC from CL.

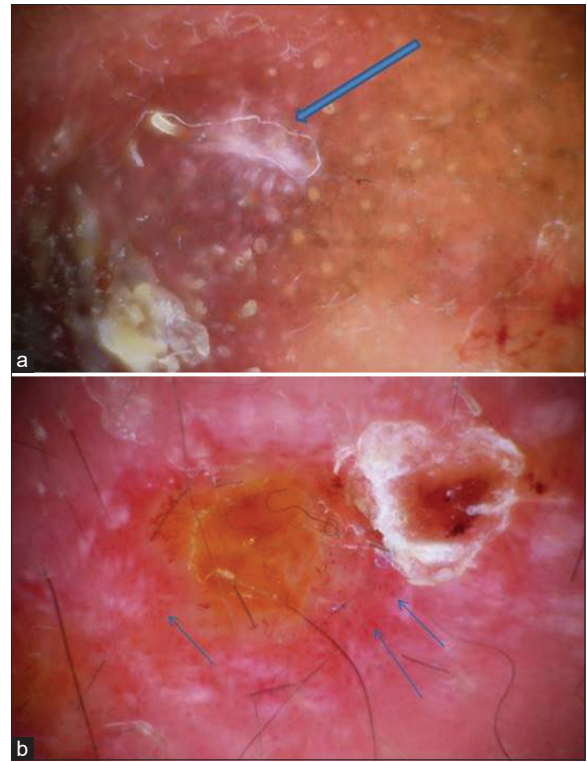


Figure 5: (a) The dermoscopic examination of the lesion shows starburst pattern (blue arrow). (b) The dermoscopic examination of the lesion shows dotted vessels (blue arrow)

Linear vessels are in various sizes with a single fold.^[25] Zalaudek *et al.* detected linear vessels in 70.8% of the CL lesions on the face and in 17.9% of the SCC lesions.^[20] Yücel *et al.* detected linear vessels in 53.4% of the CL patients,^[15] Ayhan *et al.*^[16] in 26%, and Taheri *et al.*^[17] in 30.6%. These vessels were frequently observed on the face.^[15-17]

In our study, linear vessels were observed in 50.2% of the lesions, and these lesions were more commonly detected in noduloulcerative lesions (52.2%, $P = 0.843$) and on the face (58.7%, $P = 0.034$). As linear vessels may also be observed in KA and SCC, a careful differential diagnosis should be made.

Dotted vessels are observed due to placement of short and vertical capillaries around the lesion.^[26] They can be seen in verruca vulgaris, actinic keratosis, seborrheic keratosis, Bowen's disease, and also in many small keratinized tumors such as SCC.^[27] In their study, Ayhan *et al.* observed dotted vessels in 24.4% of the CL lesions. These vessels were mostly observed in the lesions on the upper extremities.^[16] In their study, Taheri *et al.* observed dotted vessels in 61.1% of the CL lesions, and these vessels were mostly observed in ulcerative plaques on the lower extremities.^[17] Dotted vessels were observed in 39.6% of the lesions in our study. Dotted vessels were mostly observed on the neck area (71.4%, $P = 0.174$) and in noduloulcerative lesions (47.8%, $P = 0.392$).

Comma-like vessels are slightly curved vessels with a diameter of ≥ 1 mm. They can be observed in lesions including melanoma,^[27] dermal nevus,^[28] dermatofibroma,^[29] and

BCC.^[23,24] Studies on CL patients have found comma-like vessels in 73%,^[18] 4.1%,^[15] 19.7%,^[16] and 29.9%^[17] of the lesions. While these vessels were most commonly observed on the face in the study by Ayhan *et al.*,^[16] they were most commonly observed on the lower extremities in the study by Taheri *et al.*^[17] In their study, Yücel *et al.* observed comma-like vessels most commonly in nodules and ulcerative lesions.^[15] Comma-like vessels were observed in 21.8% of the lesions in our study. Comma-like vessels were most commonly observed in plaque lesions (25.9%, $P = 0.394$) and on the neck (57.1%, $P = 0.021$).

Lupus vulgaris is one of the granulomatous diseases which can be confused with CL. Orange areas are also known as salmon-colored ovoids.^[15] Arborizing vessels and orange areas mostly accompany each other, and these structures are mostly observed in lesions of leishmaniasis recidivans. Therefore, orange areas are considered to be a sign of chronification.^[16] In a study by Yücel *et al.*, orange areas were observed in 13.1% of the lesions.^[15] They were observed in 15.7% of the lesions in the study by Ayhan *et al.*^[16] and in 43.8% in the study by Taheri *et al.*^[17] In our study, the combination of arborizing vessels and orange areas was observed in 34.2% of the lesions.

CONCLUSION

In our study, the vascular and nonvascular structures of the CL lesions were assessed using dermoscopy. The most common morphology of the vascular structures was linear vessels and dotted vessels and of the nonvascular structures were erythema, hyperkeratosis, crust, and teardrop-like structures. Although there is no specific dermoscopic feature specific to CL, we presume that dermoscopic findings may contribute to the differential diagnosis in the presence of clinically similar cutaneous lesions.

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Conflicts of interest

There are no conflicts of interest.

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