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Original Article

Dermoscopic features of hypertrophic scars and keloids

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Abstract

Objective The present study was conducted to outline dermoscopic features that help to differentiate between keloids and hypertrophic scars.

Methods The study is a cross-sectional observational study done at the Center of Dermatology/ Medical City, Baghdad. The study was done through December 1st 2020 to August 1st 2021 on a convenient sample of 95 patients; (33) with hypertrophic scars and (62) with keloids. History and clinical examination were done for each patient. Clinical photos were captured by using an iPhone 8 (12 megapixels) camera. Dermoscopic study was done using Handyscope classic from Fotofinder.

Results Following features were noted pigment color in keloids was pink (43.5%), while in hypertrophic scar it was brown (69.7%) (p value =0.001). The most frequent vessel shape in keloids was arborizing (46.8%), arborizing/ linear (14.5%).While in hypertrophic scars the most frequent vessel shape was dotted (39.4%), followed by linear (21.2%), (p value = 0.001).

Conclusion The vessels shape and distribution as well as the pigment was different in keloids compared to hypertrophic scars (statistically significant) which help to differentiate the 2 in clinically suspicious lesions.

Key words
Dermoscopy; Keloid; Hypertrophic scar.

Introduction

Dermoscopy is a simple diagnostic tool that allow the perception of morphologic characters that are not be seen by the human eye, its depicting a linkage between microscopic dermatopathology and macroscopic clinical dermatology.[1,2] It was originally used to differentiate benign from malignant melanocytic lesions, however its scope has been widened to include many neoplastic and inflammatory dermatoses.[1]

In their early stage of formation keloids and hypertrophic scars are clinically difficult to different from each other. Both types can be hard, raised, painful and itchy.[3] Due to the different prognosis, and the need for aggressive treatment, there is a need for a method to differentiate between keloids and hypertrophic scars in their early stage of formation.[4] The present study was conducted to outline dermoscopic features that help in the diagnosis of hypertrophic scar and keloid.

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Methods

The study is a cross-sectional observational study done at the Center of Dermatology/ Medical City, Baghdad. The study was done through December 1st 2020 to August 1st 2021. A total 95 patients attending the outpatient clinic were included in the study; 33 patients had

hypertrophic scars and 62 had keloids. Writing consent was taken from the patients, after full explanation to the patient about the objective of the study. The diagnosis made according to history, clinical examination and biopsy for suspicious lesions. A thorough history was taken including age, gender, and duration of lesions, precipitating factors, symptoms, and previous treatments. Clinical examination was carried out focusing on the following points; site, number and clinical appearance of the lesions. From each patient clinical photos were captured with a 12 megapixels iPhone 8 camera. Dermoscopic examination was performed and photos were captured with Handyscope classic from Foto-finder, German. 2010, white LED, twin light, used with iPhone 8. Autofocus images with 20x magnification with polarized mode of light were recorded. The following features were noted pigment color, pigment distribution, vessels color, vessels distribution and follicular plugging.

Results

Mean age in year for keloid and hypertrophric scar male and female ratio for keloid and hypertrophric scar are shown in **Table 1**. The most common site for keloids was the head and neck and for hypertrophic scars was the upper limb **(Table 2)**. Patients' distribution according to predisposing factors, symptoms and previous treatment are shown in **Table 3**.

Table 1 Age, gender and duration of the disease.

Variables	*Number*	*%*
Age in years		
<20	24	22.8
20-29	30	28.5
30-39	24	22.8
40-49	13	12.3
>=50	4	3.8
Gender		
Male	45	42.75
Female	50	47.5
Duration of the disease in years		
1-2	71	67.4
3-4	13	12.3
5-6	11	10.4
Grand total	95	

Table 2 Distribution of lesions according to site.

Site	*Keloids*	*Hypertrophic scars*	*Total*
Upper limb	17	11	28
Arm	6	1	7
Hand	6	1	7
Shoulder	4	1	5
Forearm	0	5	5
Elbow	0	2	2
Axilla	1	0	1
Wrist	0	1	1
Lower Limb	1	5	6
Thigh	0	3	3
Leg	0	2	2
Foot	1	0	1
Trunk	21	10	31
Chest	9	4	13
Back	8	5	13
Abdomen	4	1	5
Head and neck	23	7	30
Ear	16	0	16
Neck	4	3	7
Forehead	2	2	4
Beard	2	1	3

Dermoscopic features

1 ***Pigment color*** The pigment color of keloids was pink in 27 (43.5%) of lesions and brown in 22 (35.5%) **(Figure 1)**. The pigment color of hypertrophic scars was most frequently (69.7%) brown in color **(Figure 2; Table 4)**. There was a significant difference (P value 0.001) in pigment color between keloids and hypertrophic scars, mainly due to high number of pink pigments in keloids.

2 ***Pigment distribution*** The pigment distribution in keloids was homogenous in 41 (66.1%). The pigment distribution of hypertrophic scars in 11 (33.3%) lesions was homogenous and the same frequency was for network, while 10 (30.3%) cases had globular pigment type **(Table 4)**.

3 ***Follicular plugging*** In keloids follicular plugging was observed in 8 lesions (12.9%)

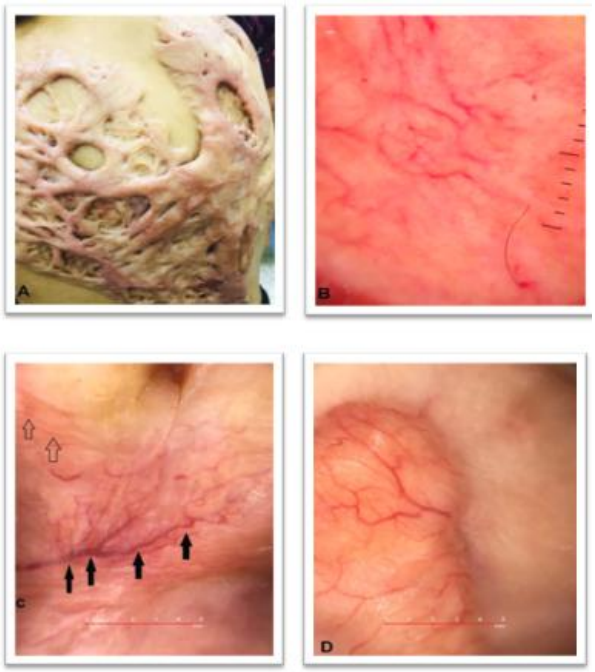

Figure 1 Keloid; A: clinical picture, B: dermoscopic picture showing violaceous homogenous pigment with arborizing blood vessels. C and D: homogenous pink background with linear blood vessel (Hollow arrow) and arborizing blood vessels (black arrows).

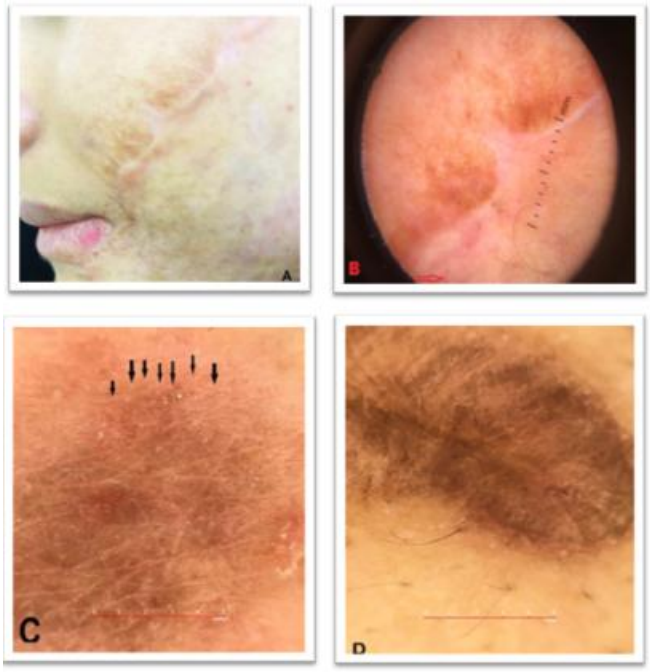

Figure 2 Hypertrophic scar; A clinical picture, B: dermoscopic picture showing brown pigment surrounded by white areas with linear blood vessels (Arrow). C: brown pigment with dotted blood vessels (arrow). D: homogenous brown pigment.

Table 3 Distribution of predisposing factors, symptoms and treatment according to diagnosis.

Variables	*Keloid*		*Hypertrophic scar*		*Total*		*P value*
	Number	*(%)*	*Number*	*(%)*	*Number*	*(%)*	
Predisposing factors							
Burn	13	21	16	48.5	29	30.5	0.033
Folliculitis	10	16.1	2	6.1	12	12.6	
Trauma	37	59.7	14	42.4	51	53.7	
None	2	3.2	1	3	3	3.2	
Symptoms							
Burning	2	3.2	1	3	3	3.2	
Itching	34	54.8	5	15.2	39	41.1	0.001
None	26	41.9	27	81.8	53	55.8	
Treatment							
IL 5-FU	4	6.5	0	0	4	4.2	
ILS	4	6.5	7	21.2	11	11.6	0.048
None	54	87.1	26	78.8	80	84.2	
Grand total	62	100	33	100	95	100	-

Note: IL 5-FU= Intralesional 5 fluorouracil, ILS= intralesional corticosteroid.

while in hypertrophic scars it was observed in 5 lesions (15.2%) **(Table 4)**.

4 ***Vessel shape*** The most frequent vessel shape in keloids was arborizing in 29 (46.8%) cases **(Figure 1-C,D)**. The most frequent vessel shape of hypertrophic scars was dotted (39.4%) **(Figure 2C)**. There was a significant difference in vessel shape between keloids and hypertrophic scars (P value=0.001), mainly due to more arborizing shape in keloids and more dotted shape in hypertrophic scars **(Table 5)**.

5 ***Vessel distribution*** The vascular distribution

Table 4 Pigment color and distribution and follicular plugging in keloids and hypertrophic scars.

Variables	*Keloids (62)*		*Hypertrophic scars (33)*	
Pigment color	*Number*	*(%)*	*Number*	*(%)*
Brown	22	35.5	23	69.7
Pink	27	43.5	3	9.1
Violaceous	11	17.7	4	12.1
Purple	1	1.6	1	3
Pink center/ brown periphery	1	1.6	0	0
White center/ brown periphery	0	0	1	3
White center/ violaceous periphery	0	0	1	3
Pigment distribution				
Homogenous	41	66.1	11	33.3
Network	13	21	11	33.3
Globular	6	9.7	10	30.3
Ulcerative center/ homogenous periphery	1	1.6	0	0
Homogenous center/ network periphery	1	1.6	1	3
Follicular plugging	8	12.9	5	15.2

Table 5 Vessel shape and distribution in keloids and hypertrophic scars.

Variables	*Keloid (62)*		*Hypertrophic scar (33)*	
	Number	*(%)*	*Number*	*(%)*
Vessel shape				
Arborizing	29	46.8	1	3
Arborizing/ linear	9	14.5	3	9.1
Arborizing/ dotted	6	9.7	0	0
Dotted	2	3.2	13	39.4
Dotted/ linear	3	4.8	5	15.2
Dotted/ coma shape	0	0	1	3
Linear	8	12.9	7	21.2
Linear/ coma shape	1	1.6	0	0
Non-vascular	4	6.5	3	9.1
Vascular distribution				
Total	36	58.1	12	36.4
Peripheral	19	30.6	15	45.5
Central	3	4.8	3	9.1
No	4	6.5	3	9.1

in keloids was total in 36 (58.1%). While in hypertrophic scars it was peripheral in 15 (45.5%) cases **(Table 5)**.

Discussion

Keloid and hypertrophic scar are abnormal tissue response to trauma with excessive collagen formation.[3] While hypertrophic scars improve with time, keloids are less likely to improve and therefore treatment is advised.[3] Differentiating the 2 can be challenging mostly in their early stage of formation. Both types of abnormal scarring can be tough, raised and painful.[3]

Dermoscopy provides a way to visualize structures beneath the skin surface such as blood vessels and pigment therefore it may be an important method in the differentiation. However there are very few studies dealing with the dermoscopic characters of keloids and hypertrophic scars.[6] The present study was conducted aiming to detect the dermoscopic character of both types of scars.

In the present study most of the patients were young adults with a mean age of 27.3 years and there was no significant difference between the keloid group and the hypertrophic scarring group regarding the age.

This may be explained by that the young individuals more prone to trauma in whose skin has a greater skin tension and more elastic fibers. The rate, of collagen synthesis is much more in the younger population.[6]

While most common pigment color in keloids was pink followed by brown, in hypertrophic scars the most common color was brown followed by violaceous. This difference in color was statistically significant. The pigment distribution of keloids was more commonly homogenous (66.1%) than hypertrophic scars (33.3%), There was a significant difference in pigment distribution between keloids and hypertrophic scars. Pigment color and distribution were not mentioned in previuos studies dealing with the 2 entities. It can be assumed that the brown color in hypertrophic scars is due to hyperpigmented rete ridges. While keloids were pink because they are more vascular.

In the present study blood vessels were seen in both keloids and hypertrophic scars by dermoscopy 93.5 % and 91.9 % respectively, while Abdallah *et al.*[6] found plenty of vascular structures in keloids more than in hypertrophic scars as they found vascular structures in 80% of keloids and only in 20% of hypertrophic scars. In the present study arborizing vessels was seen in (46.8%) of keloids, whereas only 3% of hypertrophic scars showed arborizing vessels. The most common vessel shape in hypertrophic scars was dotted (39.4%). These results are similar to Abdallah *et al*;[6] Yoo *et al.*[4] and Jin *et al.*[7] who reported that arborizing vessel pattern was more common in keloids than in hypertrophic scars.

Histologically, keloids exhibit tissue hypoxia which leads to increase production of vascular endothelial growth factors which in turn will cause microvessel regeneration. These microvessels are subepidermal in location; they are dispersed, extended and parallel to the skin surface. Therefore on dermoscopy they are seen in full length and appear arborizing. While hypertrophic scars have unique nodular structures made of collagen-forming hard nodules and cells with little blood vessels and the vessels are vertically oriented and deep in the dermis and because dermoscopy offers a horizontal view the vessels appear as dot-like.[8]

References

1. Zalaudek I, Kreusch J, Giacomel J, Ferrara G, Catricala C, Argenziano G. How to diagnose nonpigmented skin tumors: a review of vascular structures seen with dermoscopy: part I. Melanocytic skin tumors. *J Am Acad Dermatol*. 2010;**63(3)**:361-74.
2. Argenziano G, Soyer HP, Chimenti S, Talamini R, Corona R, Sera F, Binder M, Cerroni L, De Rosa G, Ferrara G, Hofmann-Wellenhof R. Dermoscopy of pigmented skin lesions: results of a consensus meeting via the Internet. *J Am Acad Dermatol*. 2003;**48(5)**:679-93.
3. van den Broek LJ, Limandjaja GC, Niessen FB, Gibbs S. Human hypertrophic and keloid scar models: principles, limitations and future challenges from a tissue engineering perspective. *Exp Dermatol*. 2014;**23(6)**:382-6.
4. Yoo MG, Kim IH. Keloids and hypertrophic scars: characteristic vascular structures visualized by using dermoscopy. *Ann Dermatol*. 2014;**26(5)**:603-9.
5. Wei Y, Li-Tsang CW, Luk DC, Tan T, Zhang W, Chiu TW. A validation study of scar vascularity and pigmentation assessment using dermoscopy. *Burns*. 2015;**41(8)**:1717-23.
6. Abdallah M, Yassin M, Saber N. Dermoscopic features of keloid versus hypertrophic scar. *Egypt J Hosp Med*. 2018;**70(4)**:622-4.
7. Jin H, Yang MY, Kim JM, Kim GW, Kim HS, Ko HC, Kim BS, Kim MB. Arborizing vessels on dermoscopy in various skin diseases other than basal cell

carcinoma. *Ann Dermatol*. 2017;**29(3)**:288-94.
8. Lee JY, Yang CC, Chao SC, Wong TW. Histopathological differential diagnosis of keloid and hypertrophic scar. *Am J Dermatopathol*. 2004;**26**:379-84.