

Dermscopic Features of Keloid versus Hypertrophic Scar

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ABSTRACT

Background: Hypertrophic scars and keloids can be described as variations of typical wound healing.

Aim of this study was to find out the dermscopic differentiating features between keloids and hypertrophic scars in their recent phases of development in Egyptian population.

Patients and Methods: An observational cross-sectional design of 30 cases that assigned according to histopathological analysis into two groups; Keloids and Hypertrophic scars. Then the polarized non-contact mode of a Dermlite© DL3 “Gen, USA” at a magnification of 10 × was used to capture dermscopic images for both groups. The surface morphology and the dermscopic criteria were recorded directly from the patients and included vascular structures (Arborizing, linear and comma shaped vessels), erythematous or white patches. **Results:** Statistical analysis revealed that patients with keloids are more likely to be associated with the presence vascular structures on dermscopy. The analysis of types of vascular structures showed that arborizing vessels, in particular, were significantly related to keloids. In contrast, the dominant dermscopic feature in Hypertrophic scarring was the presence of scarring as presented in the form of erythematous or white patches with scanty or absent vascularization. **Conclusions:** Dermoscopy should be considered as a routine investigation of any case with abnormal scarring for a better differentiation between keloids and hypertrophic scars, and hence a better evaluation and treatment of each type.

Keywords: Keloid, Hypertrophic scar, vascular structures, handheld dermscopy.

INTRODUCTION

Wound healing is a natural restorative response to a tissue injury. It is the interaction of a complex cascade of cellular events that generates resurfacing, reconstitution, and restoration of the tensile strength of injured skin¹. Hypertrophic scars and keloids can be described as variations of typical wound healing. As the scar matures, it becomes hyperemic and it may be thickened; however, it tends to subside gradually until a flat, white, pliable, possibly stretched, and mature scar develops. When an imbalance during the healing process occurs, more collagen is produced than is degraded, and the scar grows in all directions². A keloid is an abnormal proliferation of the scar tissue that forms at the site of cutaneous injury. It does not regress and grows beyond the original margins of the scar³. On the other hand, the hypertrophic scar is a widened or unsightly scar that does not extend beyond the original boundaries of the wound. Unlike keloids, the hypertrophic scar reaches a certain size and subsequently stabilizes or regresses⁴. Dermoscopy is a widely used non-invasive diagnostic technique which provides up to a ten times greater magnification than the unaided eye and can show the structure of the upper layer of the dermis, and therefore yielding many diagnostically relevant findings⁵. Because of the difficult distinction between keloids and hypertrophic scars clinically and the unpractical application of histopathological differentiation due

to the high cost and lengthy preparation time; studied the dermscopic features of keloids and hypertrophic scars to differentiate them based on their characteristic dermscopic features and they could demonstrate distinctive dermscopic features especially in keloids where vascular structures including arborizing, linear irregular and comma shaped vessels were frequently seen⁵.

MATERIALS AND METHODS

This study was conducted on 30 patients with recent scars who were selected from the Outpatient Dermatology clinic of Ain Shams University Hospitals during the period of September 2015 to February 2017. Inclusion criteria were a clinical and histological diagnosis of Keloids and hypertrophic scars. We excluded all cases who had received previous treatment and patients with old scars (more than 6 month). The subjects were classified into 2 groups (15 subjects with keloid scars and 15 subjects with hypertrophic scars) according to histopathology. Then dermscopic images had been captured with a Dermlite© DL3 “Gen, USA” at a magnification of 10 × for both keloids and hypertrophic scar groups. The dermscope used in the polarized non-contact mode because, the blood vessels that are located in the dermis collapse easily by the pressure applied when performing contact dermscopy. This causes blanching of the lesion and loss of important

vascular criteria. All participants gave their informed consent. Patient demographics and dermoscopic criteria were recorded for both groups.

Statistical analysis

The collected data was revised, coded, tabulated, and introduced to a PC using Statistical package for Social Science (SPSS 15.0.1 for windows; SPSS Inc, Chicago, IL, 2001). Data was presented, and suitable analysis was done using student T Test, was used to assess the statistical significance of the difference between two study group means, Chi-Square test was used to examine the relationship between two qualitative variables and Fisher’s exact test used to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells. **The study was approved by the Ethics Board of Ain Shams University.**

RESULTS

The study included 30 patients with scars (keloid and hypertrophic scar), the age of the patients ranged from 4 to 50 years with a mean age of 22.6. They were 13 males and 17 females. The patients were classified into two groups. Patients with keloids (15 patients) were 7 males and 8 females and their ages ranged from 4 to 40 with a mean of 20.33 (± 9.78 SD). The other group, patients with hypertrophic scars, included 15 patients, 6 males and 9 females, and their ages ranged from 6 to 50 with a mean of 24.27($SD \pm 12.68$) (table 1). All the scars were recent scars (with a maximum scar age of 6 months). The scar duration ranged from 3 to 6 months for patients with keloids with a mean of 4.93, whereas hypertrophic scars were 4 to 6 months with a mean of 5.07. Regarding the skin phototype, all the enrolled patients were skin phototype III, and IV with predominance of skin type III (table 1). No statistical significant difference was observed between the two study groups as regard the skin phototype.

Table (1): Age, sex and skin phototype description among the study groups

		The studied groups		P-value	Sig.
		Keloids (n=15)	HS (n=15)		
Age (Mean \pm SD)		20.33 \pm 9.78	24.27 \pm 12.68	0.350‡	NS
Sex	Male (n %)	7 (46.7%)	6 (40.0%)	0.713*	NS
	Female (n %)	8 (53.3%)	9 (60.0%)		
Skin phototype	III (n %)	13 (86.7%)	14 (93.3%)	1.0**	NS
	IV (n %)	2 (13.3%)	1 (6.7%)		

SD; standard deviation, n; number of patients, sig.; significance, NS; non-significant, HS; hypertrophic scar, ‡Student t test, *Chi-square tests, **Fisher exact test

The presence of different vascular structures in a background of a white scarring patch was the most characteristic dermoscopic findings in keloidal scarring (*Fig.1*). In contrast, the dominant dermoscopic feature in HS scarring was the presence of scarring as presented in the form of erythematous or white patches with scanty or absent vascularization (*Fig.2*). Many vascular structures were detected in 80% of the keloidal cases in comparison to only 20% of hypertrophic scar cases. Keloids showed a significantly higher rate of vascular structure detection on dermoscopic examination in comparison to hypertrophic scars (P value = 0.001) (table 2). The arborizing vessels, linear and comma shaped vessels comprise the three vascular patterns observed in dermoscopy of keloids with a mean of 22.50 (SD ± 9.19) and hypertrophic scars with a mean of 12.67 (SD ± 7.02). The rate of detection of arborizing vessels was significantly higher in keloids than in hypertrophic scars, while the rate of detection of coma shaped vessels and linear vessels didn’t show statistical difference between keloids and hypertrophic scars (table 2).



Fig. 1: A keloid on neck with a dermoscopy showing show arborizing vessels (arrows)



Fig. 1: A keloid on neck with a
Fig. 2: A hypertrophic scar on the arm
Dermoscopically, a white patch with no vascularization was seen.

Table (2): Comparison between keloids and hypertrophic scars regarding the dermoscopic detection of vascular structures

		The study groups				P value	Sig.	
		Keloid N=15		HS N=15				
		No	%	No	%			
Dermoscopic Features	The prevalence of dermoscopic vascular structures	12	80	3	20	0.001*	H.Sig	
	Types of vascular structure	Comma shaped vessels	3	20	1	6.7	0.598**	NS
		Arborizing vessels	12	80	2	13.3	0.001*	H.Sig
		Linear vessels	5	33.3	2	13.3	0.390**	NS

NO; number of patients, sig.; significance, NS; non-significant, HS; hypertrophic scar, H.Sig.; Highly significant, *Chi-Square Tests **Fisher exact test.

DISCUSSION

Attempts to clinically differentiate the keloids from hypertrophic scars are difficult especially in their early phases of formation. Both types of abnormal scarring can be firm, raised, itchy and painful, however; hypertrophic scars are generally confined to the original wound borders, whereas keloids extend beyond the boundaries of the original lesion⁶.

Because of the different prognosis of the two adverse scars, and hence the need for more aggressive measures in treatment of keloids; dermatoscopy appears to provide the privilege of being a non-invasive diagnostic tool for differentiation between keloids and hypertrophic scars in their early phases of formation. In the view of the few studies investigating the dermoscopic characteristics of abnormal scarring conditions, we conducted this study aiming to find out the characteristic dermoscopic features of both types of scars.

Our study included 30 patients, most of them were young with a mean age of 22.6 and there was no significant difference between the keloidal group and the hypertrophic scarring group as regards the age. This finding is consistent with the results of

Macdonald and Deitch⁷ who reported the high incidence of abnormal scarring occurrence in young individuals between 10 to 30 years of age. This was attributed to the more liability to trauma in young individuals whose skin possesses more elastic fibers, and hence a greater skin tension. Besides this, the rate of collagen synthesis is much higher in young population.

Regarding the dermoscopic features in keloids and hypertrophic scars, the most significant difference was the dermoscopic abundance of the vascular structures in keloids more than in hypertrophic scars as we could detect vascular structures in 80% of keloidal cases , while only 20% of hypertrophic scars showed the presence of vessels on dermoscopy (p=0.001).

Yoo and Kim, dermoscopically examined 30 cases of keloids and 11 cases of hypertrophic scars and they detected the presence of arborizing, comma shaped and linear irregular vessels in 90% of keloids, whereas only 27% of hypertrophic scars expressed vascular structures⁵. This difference is probably attributed to the histological differences between keloids and hypertrophic scars as regards their vasculature. The blood vessels in keloids are

small numerous and aggregating just beneath the epidermis in keloids while they are vertically oriented around the collagen nodules in hypertrophic scars⁸. As the dermoscope provides a horizontal view of the lesions, the vasculature in the keloids is much easier to be detected in keloids than in hypertrophic scars. Moreover, the vasculature could be richer in keloids than in hypertrophic scars. The microvasculature was found to be associated with luminal occlusion by the endothelial cells in keloids^{9,10}. This impaired blood supply and the resultant hypoxia within the keloid tissue is believed to encourage the production of vascular endothelial growth factor (VEGF) and hence the enhanced vascularity¹¹.

Our study showed that arborizing vessels are more reliable than other types of vessels for the dermoscopic differentiation between keloids and hypertrophic scars because the presence of arborizing vessels was much more in keloids (80%) than in hypertrophic scars (13.3%), the same result detected by Jin *et al.*, 2017 reported that the most common dermoscopic vascular structure in keloid and hypertrophic scars was arborizing, followed by linear irregular and comma-shaped vessels.

The current study emphasized the findings of the previous study of **Yoo and Kim (2014)**⁵ regarding the dermoscopic characteristic features of keloids and hypertrophic scars. Thus, based on the distinct dermoscopic characteristics of keloids and hypertrophic scars, we believe that dermatoscopy could be a reliable and a valid diagnostic tool that can distinguish between keloids and hypertrophic scars in the clinical settings.

However, as the present study is limited by the small number of patients, further studies on a larger scale are encouraged.

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