The Egyptian Journal of Hospital Medicine (January 2025) Vol. 98, Page 447- 452

Potential Utility of Dermoscopy in the Evaluation of Ocular Surface Lesions

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ABSTRACT

Background: Dermoscopy is a non-invasive technique used widely to diagnose skin and mucosa lesions. Reports about its utility in ocular surface lesion diagnoses are scarce.

Objective: The aim of the study was to investigate the potential utility of dermoscopy in the evaluation of ocular surface lesions.

Patients and methods: A prospective, non-randomized and interventional study that included 20 eyes with ocular surface lesions. A complete ophthalmic examination was performed to all patients, followed by dermoscopic images of the lesions. Surgical excision and histopathologic examination were performed for those lesions. An experienced blinded dermatologist studied the dermoscopic images for specific patterns, colors, and types of vessels. The dermatologic findings were correlated to the established diagnosis confirmed with histopathology.

Results: The dominant dermoscopic feature of ocular surface squamous neoplasia (OSSN) was the presence of arborizing vessels in 8 (70 %), linear in 54 %, serpentin in 4 (36%) and dots in 36%. The pattern was structureless in 9 (81 %) reticular in 1 (9 %) and homogenous in 1 (9 %). The predominant colors were white in 9 (81%), grey in 7 (63%), and pink in 5 (45 %). The dermoscopic features of conjunctival naevi were light-brown pigmented homogenous and reticular pattern in 6 lesions (100 %).

Conclusion: Dermoscopy is a practical and noninvasive technique for examining ocular surface lesions, giving strong clues for diagnosis and differentiation between benign and malignant lesions.

Keywords: Dermoscopy, Ocular surface lesions, Ocular surface squamous neoplasia.

INTRODUCTION

Ocular surface disorders (OSD) include a large & varied spectrum of conjunctival and corneal conditions. OSD includes benign & malignant lesions [1]. Diagnosis of OSD is aided by clinical images of the anterior segment of the eye at high magnifications by slit lamp. Analysis of OSD by imaging methods such as anterior segment optical coherence tomography, reflectance confocal microscopy, and high-frequency ultrasound biomicroscopy is expensive and needs a highly specialized center. When clinical observation cannot reliably diagnose the condition, incisional or excisional biopsy and histopathology is needed [2].

Dermoscopy is a crucial noninvasive technique widely used by dermatologists for the diagnosis & monitoring of various skin lesions [3]. It enables the examination of the papillary dermis, dermo-epidermal junction, & epidermis microstructures [2]. It aids in the determination of tumor surface boundaries, assessment of the effects of local therapies, and avoidance of unnecessary biopsy [4]. Prespecified dermoscopic features improve the diagnosis and triage of skin lesions in telemedicine [5, 6]. The dermoscopic examination boosts diagnosis accuracy from five percent to thirty percent [7]. The technique uses a dermoscope (also called dermatoscope), a handheld magnifying lens with polarized and nonpolarized light settings. A dermoscope can quickly be joined to a camera or smartphone attachment to acquire and store high-resolution photos of the area under investigation [8]. The difference between polarized and nonpolarized dermoscopy is that polarized dermoscopy doesn't touch the lesion, while nonpolarized contact dermoscopy touches the lesion. Polarized light dermoscopy preferentially highlights subsurface features with or without contact with the lesion. Nonpolarized dermoscopy reveals a detailed view of surface characteristics, mainly when performed with contact to the lesion [4, 5].

In our research, we tried to highlight some OSD lesions' dermoscopic features and evaluate the dermoscopy's utility in their diagnosis.

PATIENTS AND METHODS

This prospective, non-randomized interventional study included 20 patients older than eighteen years old with ocular surface lesions that were presented to the Department of Ophthalmology, Faculty of Medicine for Girls, Al-Azhar University Hospital, Cairo, Egypt, and National Eye Center, Rod El-Farag (Oncology Unit). Between April 2022 and April 2023, Lesions were examined clinically & dermoscopically, and histopathologic examination after surgical excision was performed in all cases.

Patients with a previous history of lesional biopsy or excision or with superficial degenerative lesions such as

Received: 03/09/2024
Accepted: 04/11/2024

pterygium and pinguecula w**ere excluded from the study.**

Dermoscopic photography were taken using DermLite HÜD (polarising) handheld dermoscopy, which also had a slide-on adapter for the iPhone 6 Plus & polarized USB-rechargeable skin magnifier. We were able to obtain dermoscopic photographs of lesions without touching them with a distance about one cm from the lesion, because of the polarizing technology of dermatoscopy utilized in this investigation. The dermoscope used was attached to a contact plate with a 4 × 4 mm hair-line reticule, as opposed to the traditional, larger contact plate used in dermatology clinics, which has a 10 mm reticule.

A dermatology consultant evaluated the images according to the score of Blum & Colleagues [9] for mucosal lesions for the following dermoscopic features: Pattern of dots, globules, clods, circles, and lines. If none of these basic elements were present, the pattern would be described as structureless. About color, the presence of brown, black, blue, gray, red, purple, pink, and white, as well as several colors in the lesion. Also, vascular patterns, including linear, comma, arborizing, hairpin and glomerular vessels were identified. The dermoscopic evaluation was correlated to the diagnosis confirmed by histopathology.

Ethical considerations: The study was done after being accepted by The Research Ethics Committee, Al-Azhar University. All patients provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in the study and for the publication of data, ensuring protection of their confidentiality and privacy. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Statistical packages for Social Science have been used to review, code, tabulate, & introduce acquired data to computers (SPSS 25). Data were presented, & type of data obtained for each parameter had been appropriately analyzed. Descriptive statistics: For numerical data, mean, standard deviation, & range are used. For non-numerical data frequency & proportion are used . $P \leq 0.05$ was considered significant.

RESULTS

Our study included 9 (45%) males and 11 (55%) females. 5 (25 %) of patients were smokers. 7 (35%) lesions were in the right and 13 (65%) in the left eye. Regarding anatomical site, 13 lesions (65%) were in temporal bulbar conjunctiva, 5 lesions (25%) were in nasal conjunctiva, and 2 (10%) lesions were in both temporal and nasal sides. 10 (50%) lesions showed irregular surfaces. 11 lesions (55%) involved the cornea. The dermoscopic features are presented in table (1) and figures (1, 2, 3 and 4). Analysis of the dermoscopic features of OSSN lesions revealed that the most prevalent pattern was the structureless pattern in 9 lesions (81%).

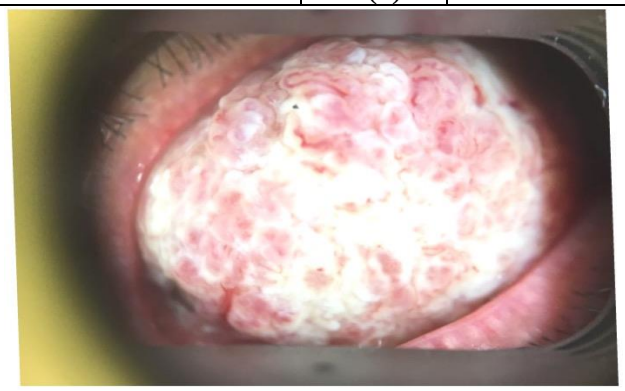
A homogenous pattern was detected in 1 (9%) lesion and a reticular pattern in 1 (9%) lesion. Regarding the vasculature, we detected the presence of arborizing, linear, serpentine, and dots vessels in 8 (72%), 6 (54%), 4 (36%) and 4 (36 %) of the lesions respectively. While coma, hairpin and glomerular vessels were detected in 2 (18 %) lesions for each.

The least prevalent were red globules and vascular clods that was observed in only 1 (9 %) lesion for each. As regards color, we observed a diversity of colors in each lesion. White, grey, and pink were observed in 9 (81%), 7 (63%), and 5 (54%) lesions respectively. While, brown, blue, black, and yellow colors were detected only in 1 (9 %) lesion for each. For the benign nevi, the pattern was homogenous and reticular in 6 (100%) lesions. Brown color was observed in 6 (100%) lesions with no intralesional vasculature. The dermoscopic features of sebaceous carcinoma was the presence of structureless and globular patterns in 1 (100 %) lesion, the presence of multiple colors of brown, gray, white, and yellow in 1(100%) lesion, and the existence of many vascular shapes including linear, arborizing, serpentine, red globules and dots in 1 (100%) lesion. The chronic inflammatory lesion showed a homogenous pattern in 1 (100%) lesion, pink color in 1 (100 %) lesion, and arborizing vasculature in 1(100 %) lesion. The dermolipma lesion revealed a homogenous pattern in 1 (100 %), arborizing vasculature in 1 (100 %) lesion, and a mixed color of pink and yellow in 1 (100 %) lesion .

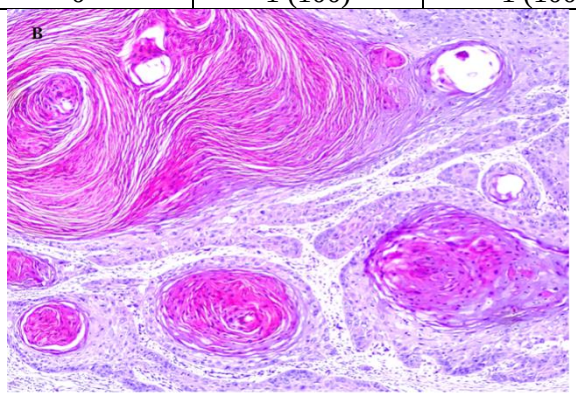
Histopathology of the 20 excised lesions revealed 11 (55 %) ocular surface squamous neoplasia (OSSN) and 1 (5%) sebaceous carcinoma, and 8 (40 %) benign lesions, including 6 (30%) conjunctival naevi, 1 (5%) dermolipoma and 1 (5 %) chronic inflammatory reaction.

Table 1: Dermoscopic features of ocular surface lesions

Number of Lesions	**OSSN N (%) 11**	**Naevus N (%) 6**	**Chronic inflammatory reaction N (%) 1**	**Dermolipoma N (%) 1**	**Sebaceous carcinoma N (%) 1**
Dermoscopic patterns					
Homogenous	1 (9)	6 (100)	1	1	0
Globules	0	0	o	0	1(100)
Reticular	1 (9)	6 (100)	0	0	0
Structurless	9 (81)	0	0	0	1 (100)
Type of vessels					
Linear	6 (54)	0	0	0	1
Hairpin	2 (18)	0	0	0	0
Arborizing	8 (72)	0	1 (100)	1 (100)	1
Serpentine	4 (36)	0	0	0	1
Red globules	1 (9)	0	0	0	1
Vascular clods	1 (9)	0	1	0	0
Dots	4 (36)	0	0	0	1
Comma	2 (18)	0	0	0	0
Glomerular	2 (18)	0	0	0	0
Color					
Brown	1 (9)	6 (100)	0	0	1 (100)
Grey	7 (63)	0	0	0	1 (100)
Blue	1 (9)	0	0	0	0
White	9 (81)	0	0	0	1 (100)
Pink	5 (45)	0	1 (100)	1 (100)	0
Black	1 (9)	0	0	0	1 (100)
Yellow	1 (9)	0	0	1 (100)	1 (100)



A)



B)

Figure (1): A-Non-contact polarizing dermoscopic picture of pinkish white aggressive conjunctival lesion encroaching on the cornea showing polymorphous vessels (dotted, comma like and linear) with vascular clods and structureless pattern. **B**-Histopathology picture stained with H & E shows keratin pearls characteristic of squamous cell carcinoma.

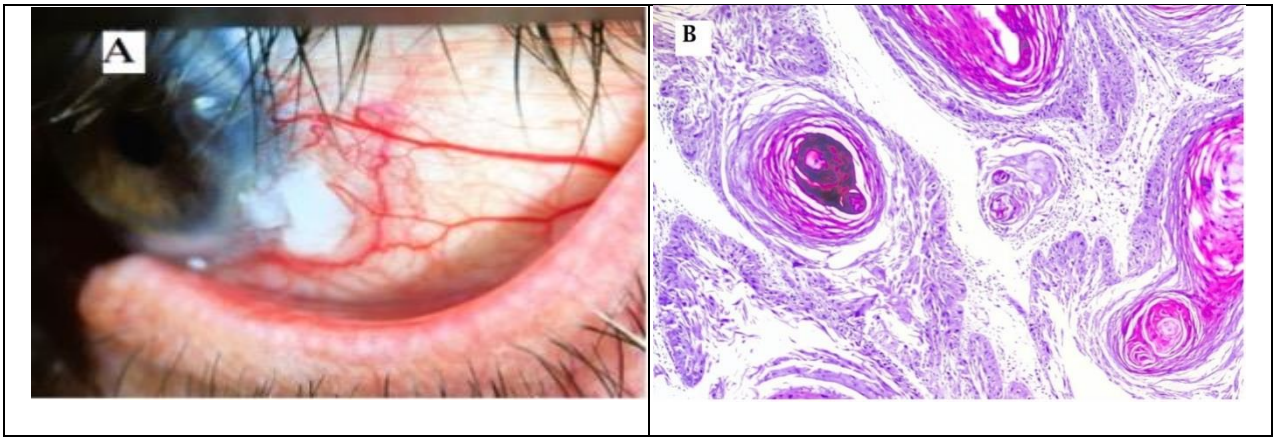


Figure (2): A- Non-contact polarizing dermoscopic picture left temporal pinkish white non-pigmented conjunctival lesion showing linear and arborizing vascular pattern. **B-** Histopathology proved OSSD.

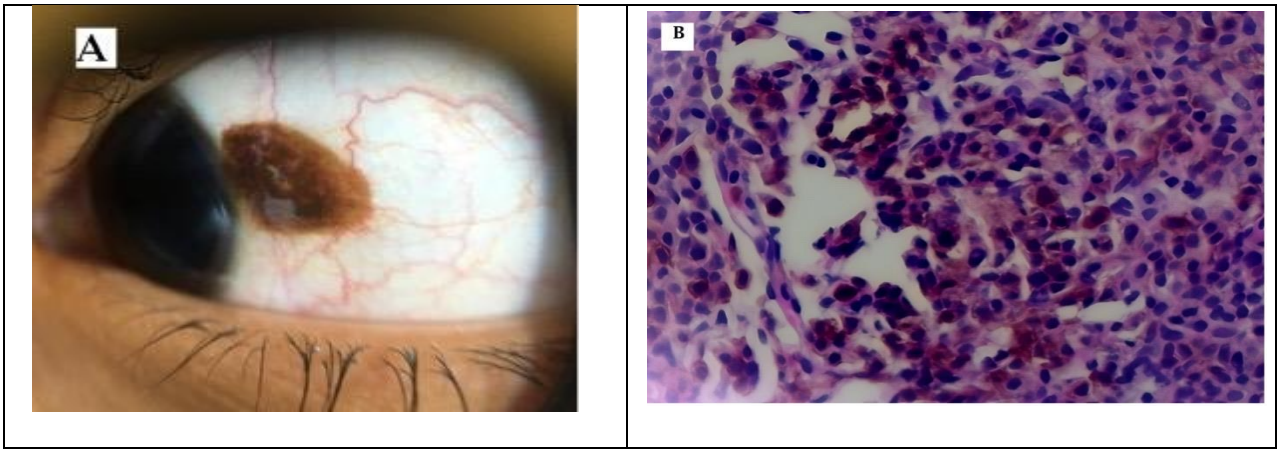


Figure (3): A- Non-contact polarizing dermoscopic picture shows homogenous reticular pigment pattern. **B-** Histopathology proves the diagnosis of conjunctival naevus (connective tissue showing group of naevus cells with regular vesicular nuclei and containing cytoplasmic melanin granules).

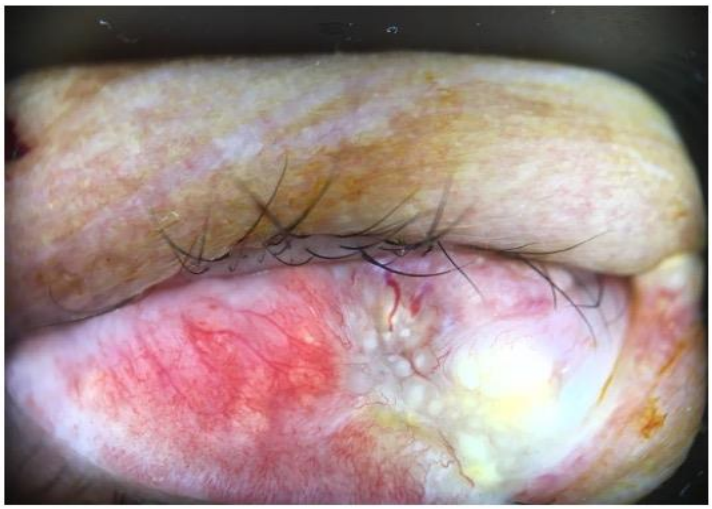


Figure (4): Non-contact polarizing dermoscopic picture of sebaceous carcinoma showing the globular and structureless pattern, the diversity of vessels including serpentine, arborizing entities and the yellow predominant color.

DISCUSSION

Skin, oral & vaginal mucosa have been the subject of many dermoscopy researches, however the ocular surface has been rarely examined [2]. In our research, we studied the dermoscopic criteria of 20 ocular surface lesions and correlated those criteria with diagnoses confirmed by histopathology.

In the current study, we used a 10x magnifying dermoscopy attached to the camera, incorporating a contact plate with a 4 × 4 mm reticule on the dermoscopy. This is the same technique used by **Schneider *et al*.** [5],

In our study, the diagnosis was confirmed with histopathology. In this, we agree with many other authors [1, 10, 11, 12, 13], while **Kaçar *et al.*** [2], in their study used impression cytology for diagnosis confirmation. We followed the dermoscopic features described by **Blum *et al.*** [9], which were designed for mucosal lesions evaluation. Many other authors [1, 10, 12] followed the same features as up to our knowledge, there is no specific ocular dermoscopic features. But **DĘbicka-Kumela *et al.*** [14] depended on modified dermatoscopic criteria and generated algorithm consisting of an assessment of the presence of 9 suspicious characteristics for evaluation of conjunctival melanocytic lesions. Our study goes synchronous with other researchers in that OSSD is the most prevalent malignant tumor of the ocular surface (55 %) while benign lesions were primarily nevi (30%) [10, 11].

Our results showed the diversity of vascular patterns in OSSD. This goes hand in hand with **Cinotti *et al.*** [12, 15] but with different percentages as our results showed the most common vascular patterns were arborizing vessels, linear, serpentine, and dots that were detected in 72%, 54%, 36% and 36 % respectively. At the same time, they stated that OSSN was primarily characterized by hairpin (75%) and glomerular (75%) and they considered those vascular types as a key distinction among OSSD & its two potential imitators, pinguecula & pterygium that had lake the presences of hairpin & glomerular vessels. We observed OSSN (11 cases) as raised tumours with whitish grayish and -pinkish plaques. The most prevalent color was white in 81% followed by grey color in 63% of cases, while **Cinotti *et al.*** [12] observed the gray color to be the most prevalent in 88% of their studied cases.

In our research we detected brown-colored homogeneous and reticular dermoscopic patterns in all benign pigmented conjunctival naevi (100%). This goes well with the **Kozubowska *et al.*** [16] review, which documented the presence of a dark-brown color prevalent in conjunctival naevi in 72% of histopathologically verified naevi. Still, they observed a grey color in 6% of cases. Additionally, they documented that 40% of naevi presented with 'clear cysts' dermoscopically presenting as whitish globules, but we didn't observe such a finding.

Our dermoscopic findings about sebaceous carcinoma are the same as observed by **Satomura *et al.*** [13] as they reported one case with polymorphous vessels and a yellow background. In addition, we observed structureless and globular patterns, multiple colors of brown, gray, white, and yellow lesions, and many vascular patterns, including linear, arborizing, serpentine, red globules, and dot vessels.

The structureless pattern was more prevalent with malignant lesions, as it was observed in 81 % of OSSD lesions and 100 % of sebaceous carcinoma. In contrast, the homogenous and reticular patterns were linked mostly with benign lesions, as it was detected in 100 % of conjunctival naevi. This agrees with **Kaçar *et al.*** [2], as they demonstrated that homogeneous & globular patterns had been predominant dermoscopic patterns in benign lesions, while the structureless pattern was linked with malignant ones. Also, this goes well with the research project by **Cinotti *et al.*** [12], as they documented conjunctival melanoma's dermoscopic characteristics as structureless patches in 100% of cases. Also, **DĘbicka-Kumela *et al.*** [8] who confirmed the asymmetry of the pattern with the structureless area as characteristic of conjunctival melanoma.

In our research, we observed that the gray, white, blue, pink and black colors were more linked with malignant lesions as the white color was found in 10 cases (50%) (9 OSSD and 1 sebaceous carcinoma), grey color was found in 8 cases (40%) (7 OSSD and one sebaceous carcinoma), pink color was detected in 7 cases (35%) (5 OSSD, 1 dermo lipoma and 1 chronic inflammatory reaction), blue color was found in one case (5%) of OSSD and black color was found in 2 cases (10%) 1 SCC and 1 sebaceous carcinoma. This agree with **Kaçar *et al.*** [2] as they highlighted 4 colours gray, white, blue and pink and stated that at least three dermoscopic structures & asymmetry in 2 axes are warning signs of malignancy.

Also, **Cinotti *et al.*** [12] documented the prevalence of grey color in the malignant lesions (63 %), while in benign nevi, only 6 % displayed grey color. Also, **DĘbicka- Kumela *et al.*** [8] who studied melanomas and confirmed a more significant average number of colors, the presence of grey color and black color was typical of malignant lesions and pre-cancerous (premalignant) lesions - primary acquired melanosis (PAM) with atypia.

Brown color was detected more in benign lesions, it was detected in 8 cases (40%) (6 conjunctival naevi, 1 SCC and 1 sebaceous carcinoma). This finding agree with **Cinotti *et al.*** [12] who observed the dark-brown color in 72% of benign conjunctival naevi while primary acquired melanosis were manifested as light-brown structureless lesions, lacked the dark brown color.

As regards vascular pattern we observed the dermoscopic criteria of malignant lesions include a diversity of vascular patterns, Linear vessels was found in

(30%) of 6 cases (OSSD) , the arborizing vessel was found in 10 cases (8 OSSD 1 chronic inflammatory reaction, and 1 dermolipoma), the serpentine vessels was found in 4 cases of OSSD, the dotted pattern was found 4 cases (OSSD), comma pattern was found in 2 cases of SCC and glomerular pattern was found in 2 cases (OSSD). We agree with **Cinotti *et al.*** [12] who observed the diversity of vascular patterns of squamous cell carcinoma of the conjunctiva-like hairpin and glomerular vessels. Also, **DĘbicka -Kumela *et al.*** [8] who observed the presence of vascular polymorphism, short vessels, a linear vascular pattern, and feeder vessels in melanoma cases.

This study has several limitations that warrant consideration. First, the small sample size may limit the generalizability of the findings, as larger studies are needed to validate the dermoscopic features identified here. Second while dermoscopic evaluation was correlated with histopathology, the lack of a control group for benign lesions such as pterygium or pinguecula reduces the comparative strength of the findings. Lastly, the use of a single dermoscopic device and operator-dependent image interpretation might limit reproducibility .

CONCLUSION

This study highlighted the potential utility of dermoscopy as a practical, noninvasive diagnostic tool for ocular surface lesions. The findings suggest that dermoscopic features such as vascular patterns, structural characteristics, and color distribution can provide valuable insights into distinguishing between benign and malignant ocular surface lesions.

While promising further large-scale, multi-center studies are required to establish standardized dermoscopic criteria and validate the findings for widespread clinical application. Incorporating dermoscopy into routine ophthalmological and telemedicine practices could reduce unnecessary surgical interventions and enhance diagnostic accuracy.

Financial support and sponsorship: Nil.
Conflict of Interest: Nil.

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