Skin Appendage Disorders

Letter

Skin Appendage Disord 2023;9:313–316
DOI: 10.1159/000530670

Received: January 16, 2023
Accepted: April 5, 2023
Published online: June 1, 2023

Cross-Polarized Photography of the Nail Unit: A Practical Way to Eliminate Specular Reflections on the Nail Plate

Fatih Göktay[a] Ozan Erdem[b]

[a]Private Dermatology Clinic, Istanbul, Turkey; [b]Department of Dermatology and Venereology, Istanbul Medeniyet University, Istanbul, Turkey

Dear Editor,

Photographing the nail unit plays an essential role in daily practice to document and follow nail disorders. However, due to the unique structure of the nail unit, it can be challenging in some instances. In particular, the highly reflective nature of the nail plate produces shiny areas in images, making it difficult to photograph nail bed changes and color alterations in the nail plate (shown in Fig. 1a–d, Fig. 2a, b).

While attempting to overcome this difficulty, we realized that imaging the nail unit with a dermoscope in non-contact polarized mode does not produce any glare on the nail plate, so we decided to use the same principle for nail photography. A polarized dermoscope includes two polarizers: one is in front of the light source and the other is in front of the magnifier lens. These two polarizers are placed orthogonal to each other (rotated 90 degrees). Regarding that, we desired to construct a cross-polarization filter for our DSLR camera similarly. For this purpose, we used a linear polarizing filter easily found as sheets in different sizes in the market. First, we cropped the polarizing film to match the size of the ring flash already attached to the DSLR camera. Then, we drew a circle to the center of the film, which corresponds to the lens aperture. After that, we removed this circle with a sharp blade, rotated it 90 degrees, and fixed it to the first film. Finally, we attached the cross-polarized filter that we built to the ring flash in front of the camera (online suppl. Video 1; for all online suppl. material, see https://doi.org/10.1159/000530670). Ultimately, photographs taken with this cross-polarized filter were devoid of any glare; besides, nail bed changes and nail plate color alterations were more apparent in the images (shown in Fig. 1e, f, Fig. 2c, d).

The light has three components: color, brightness, and polarization. Polarization is the vibration plane of a light wave. When a light wave hits the surface, it is either directly reflected by preserving its polarization plane or scattered to deeper layers by changing its direction. Specularly reflected light from the surface is the main reason for shiny areas in an image. The theory behind using two polarizing filters, one in front of the light source and the other in front of the detector, and placing them orthogonal to each other is to block all light waves directly reflected from the surface that cause glare [1]. In our setting, the light emitted from the ring flash passes through the first polarizing filter, becomes polarized, hits the nail plate, and does not change its polarization; then, it is entirely blocked by the second filter in front of the lens since the second polarizer is 90 degrees orthogonal to the first polarizer. In contrast, backscattered light can be detected by the camera sensor because its polarization plane has changed when scattered in deeper layers (Fig. 3).

karger@karger.com
www.karger.com/sad

Correspondence to:
Ozan Erdem, erdemozan@hotmail.com

Karger

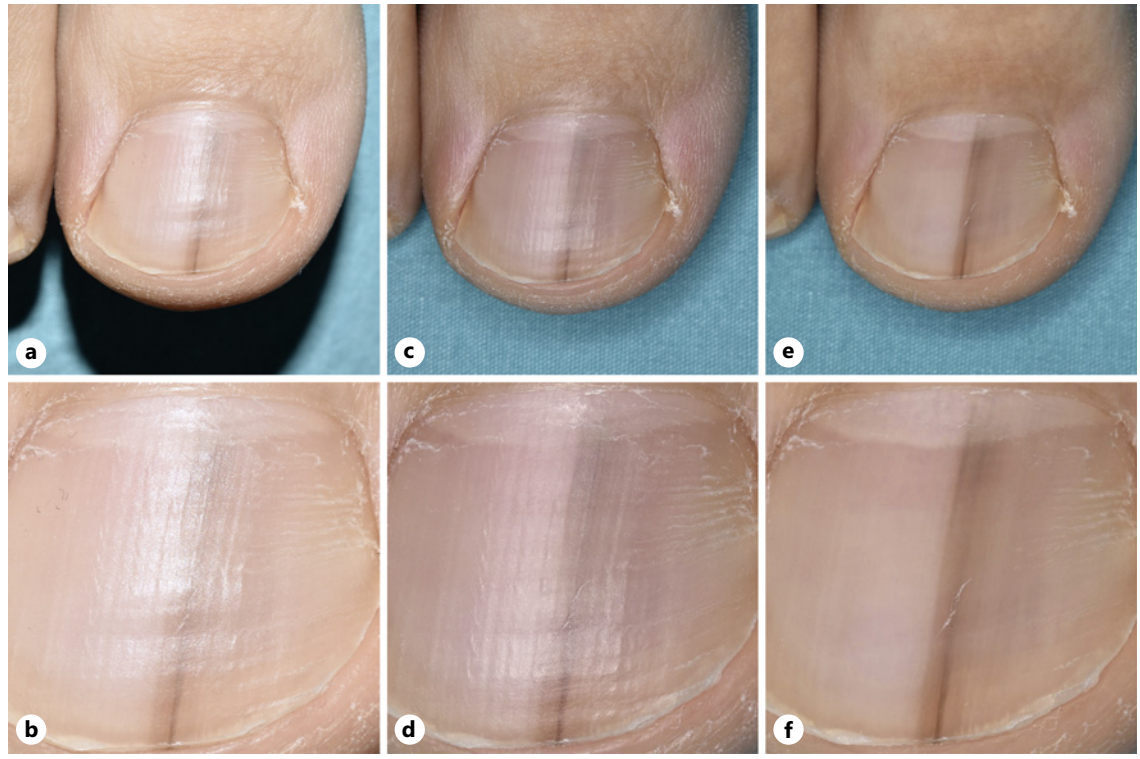

Fig. 1. a, **b** Photographs of a patient with longitudinal melanonychia captured using the built-in camera flash. The flash light is quite harsh and uneven, causing reflections on the nail plate. **c**, **d** A ring flash was used to balance the light and reduce reflections. There is still some degree of specular reflection on the nail plate. **e**, **f** The cross-polarized photography of the same patient. All shiny areas seem to have eliminated. Note that the surface texture became less evident, whereas the pigmented band on the nail plate is more apparent.

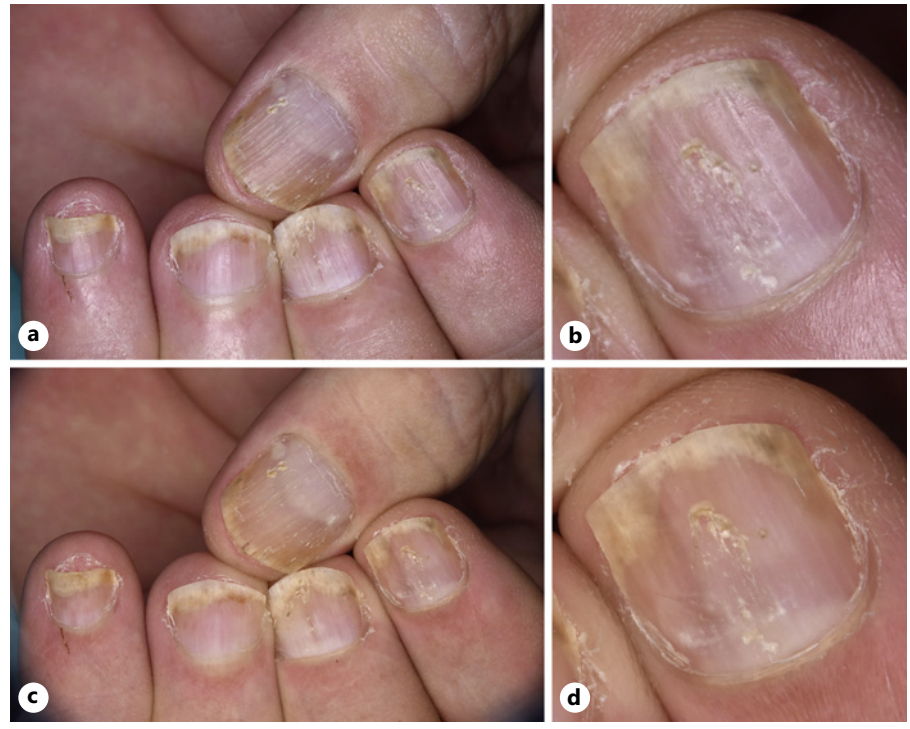

Fig. 2. a, **b** Photographs of a psoriasis patient captured using a ring flash without a polarizing filter. Pitting and longitudinal ridges are clearly visible, whereas nail bed changes are less evident due to specular reflections. **c** The cross-polarized photography of the same patient. Note that all reflections have disappeared. This photograph also demonstrates the non-contact dermoscopy-like image of all nail units in a single frame. **d** Close-up view of the index finger.

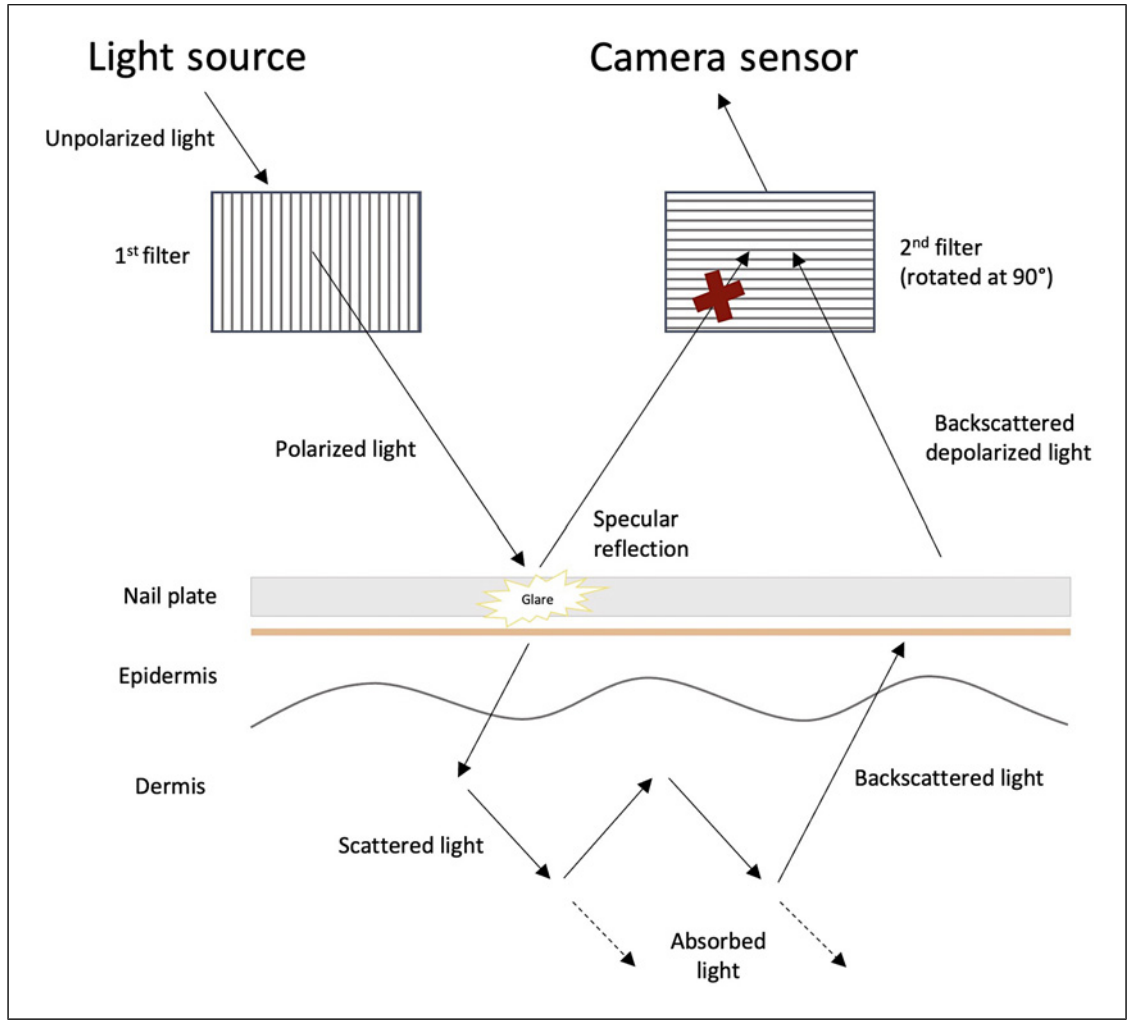

Fig. 3. Schematic illustration of cross-polarized photography.

Examination of the skin with polarized light was first described by Anderson [2] in 1991, and subsequently, a few studies have been conducted [3]. However, limited data on photographing the nail unit with a polarized filter are available in the literature. Cross-polarized photography shares the same principle as polarized non-contact dermoscopy [4]. Therefore, we believe that it will contribute invaluable information to clinicians and introduce new horizons in the imaging of the nail unit. It is also exciting that cross-polarized photography provides a polarized, non-contact dermoscopy-like image of one hand's whole nail units together in a single frame.

Statement of Ethics

The study was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. Ethics Committee approval was not required for this study according to national guidelines. The authors declare that they have obtained written informed consent from patients for publication of the clinical images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors did not receive any funding.

Author Contributions

Substantial contributions to the conception or design of the work or the acquisition, analysis, or interpretation of data for the

work, drafting the work or revising it critically for important intellectual content, final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: Fatih Göktay and Ozan Erdem.

References

1 McFall K. Photography of dermatological conditions using polarized light. J Audiov Media Med. 1996 Mar;19(1):5–9.

2 Anderson RR. Polarized light examination and photography of the skin. Arch Dermatol. 1991 Jul;127(7):1000–5.

3 Hanlon KL. Cross-polarised and parallel-polarised light: viewing and photography for examination and documentation of biological materials in medicine and forensics. J Vis Commun Med. 2018 Jan;41(1):3–8.

4 Pan Y, Gareau DS, Scope A, Rajadhyaksha M, Mullani NA, Marghoob AA. Polarized and nonpolarized dermoscopy: the explanation for the observed differences. Arch Dermatol. 2008 Jun;144(6):828–9.