Photographing Fungal Infections of the Nail and Scalp

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This case illustrates the use of photography for documenting fungal infections of the nail.

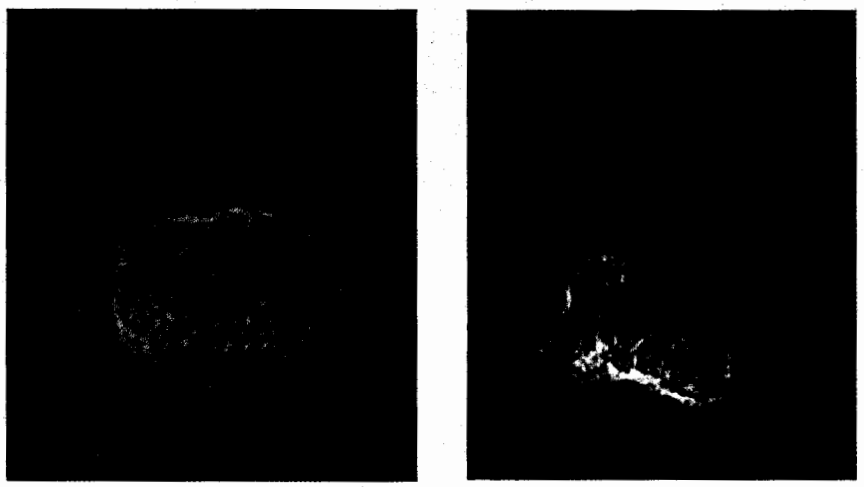
Case Report

A 45-year-old, African-American man was referred with the complaint of failure to grow his left and right hallux nails, which began after bilateral hallux nail avulsion 6 years ago. He had no significant medical history, was taking no medications, and had no known drug allergies. Examination of the left and right halluces revealed thickened dystrophic yellow-brown nail plates that thinned and tapered distally. The distal one third of the nail bed was covered with yellow-white hyperkeratotic debris extending to the lateral nail folds. The rest of the toenails and fingernails appeared normal, and there was no scale or erythema in the toe webs or on the feet.

A nail clipping was taken from both toenails, with part of each nail plate sent in separate bottles, for pathologic examination and culturing on a dermatophyte test medium (DTM). A detailed approach to the technique of tinea unguium evaluation was described by Suarez et al.[1] At the time of presentation, a photograph was taken of both toenails (Figures 1A and B) using a Polaroid camera and affixed to the chart.

Routine and periodic acid-Schiff stains of the left and right toenail clippings showed mycelia throughout the nail plate, which was consistent with the diagnosis of tinea unguium. Nail plate culture on DTM was positive. Laboratory data were followed on a monthly basis during treatment and at the completion of therapy. The laboratory evaluation included measuring the glucose, blood urea nitrogen, creatinine, potassium, sodium, chloride, and carbon dioxide levels, a liver profile, complete blood cell count with differential, and complete urinalysis. No significant abnormalities were noted.

After an initial normal laboratory evaluation and confirmation of the diagnosis of tinea unguium, the patient was started on pulse treatment with itraconazole, 100-mg tablets, 2 tablets by mouth, twice a day, for 7 days out of a month, for a total of 3 months. At follow-up visits, he showed minimal progress, with normal proximal nail growth at a rate of approximately 0.5 mm per month. Because the rest of the fingernails and toenails grew at the normally expected rate,[2] this slow growth rate was attributed to the nail matrix trauma that followed the previous nail avulsions. A photograph of each nail hallux was taken after treatment with pulse itraconazole (Figures 2A and B). The patient was given separate Polaroid pictures of his nails, to which he could refer to in the event of a recurrence.



Figures 1A and B—Pretreatment photographs of the right and left halluces, respectively, taken with a Dine Instant Print Camera, model IV.

Discussion

Although the first documented experiments in photography were performed in 1727 by Johann Heinrich Schulze (1687-1744), it was not until 1840 that the U.S. granted the first photographic

patent to Alexander S. Wolcott (1804-1844). Medicine was among the first to incorporate this new visual technology to document disease states, with human skin as its first subject. To exercise this new invention of disease documentation, one would need not only to acquire the machine, but also hire an operator. The black and white photograph would have to be taken outdoors in bright daylight, and color was added to the photograph by hand at a later date.[3,4]

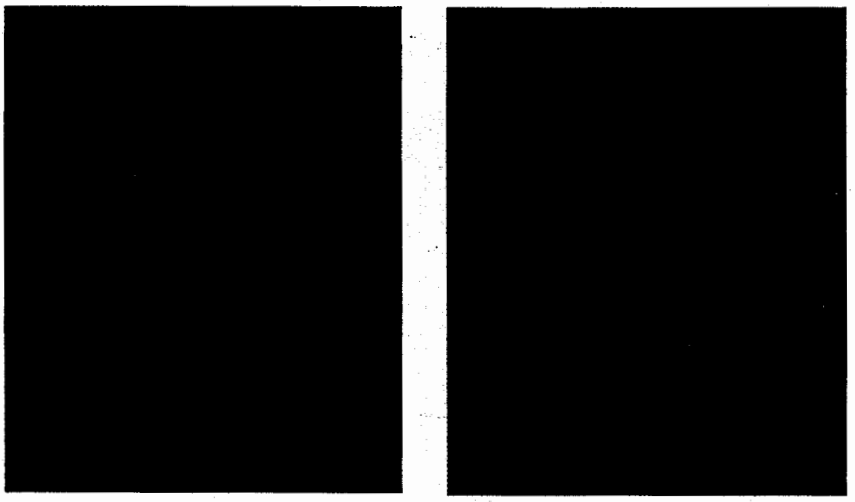
Today, the difficulty is not how to take the photograph, but rather to identify when to take the photograph, what to photograph, and which of the multiple available cameras to use. The ultimate goal of answering these questions is to provide a high-quality clinical photograph, maximizing what is clinically relevant while minimizing the background interference.[5] The second goal is to provide accurate, easily accessible documentation that enhances future follow-up by the patient, as well as the treating physicians.[6,7]

When photographing fungal infections of the nail, an attempt should be made to document the extent of involvement, which includes the extent of proximal invasion, degree of nail plate destruction, and subungual hyperkeratosis in patients with tinea unguium.

Clinicians may choose from three groups of cameras, each of which has its advantages and disadvantages. Polaroid cameras have the advantage of rapid, on-the-spot picture development. The pictures are available immediately to both the patient and the physician, allowing for operator independence. A disadvantage of Polaroid cameras is that, at times, poor resolution is produced, and there is a limited range of disease applicability. For the purpose of nail disease documentation, the Polaroid camera may be the most efficient.

The second group of cameras, conventional photography cameras, can be used with Kodachrome or Ektachrome slides or plain film. These cameras have many variations in operator dependence and degree of compactness. They still provide the best available resolution, with the possibility for close-up shots and magnifications, making these cameras best suited for taking photographs for publication. With the appropriate accessories, conventional photography cameras have limitless disease applicability.

The third type of camera is the digital camera, and future photography favors this type of camera. The digitally stored information of videotapes and photographs on personal computers allows easy storage, rapid reproduction, text addition, picture modification, and E-mail capabilities, all of which can be performed without a loss of quality to the original picture. The biggest disadvantage of these cameras is their high cost. The large entourage of accessories required, such as a color printer with matched resolution to that of the camera (one with good quality costs approximately $7,000 to $8,000) and specialized photographic paper, significantly increases the cost of these cameras. The cost and space required for the proper accessories needed to make full use of digital technology are this group's greatest draw back, especially with the desired high-quality resolution needed in dermatology.



Figures 2A and B—Posttreatment photographs of the right and left halluces, respectively, taken with a Dine Instant Print Camera, model IV.

When photographing fungal infections of the nail in a day-to-day practice, the following camera criteria should be met: (1) Low cost while maintaining high resolution that is clear enough for a 35-mm slide. (2) Operator independence—physicians should not have to spend time taking pictures. Medical assistants should be able to take the photograph quickly and with little or no training. (3) Easy, fast storage and quick retrieval when needed, while still maintaining the lowest possible cost. (4) Compactness (lightweight, easy to carry

around), which makes the camera attractive for personal (nonwork related) use as well.

Examining the current imaging cameras on the market, we choose one camera from each group that we believe would best fit each category of the previously mentioned criteria.

Polaroid camera—Figure 3 shows the Dine Instant Print Camera, model IV, which is used in everyday practice and is produced in conjunction with Polaroid. It costs a little more than $300. While the clinical pictures taken with the Polaroid Macro 5 SLR camera allow for more focusing variety and less operator error, it is significantly more expensive at a cost of $750. Both cameras are simple to use and allow photographing at a 1:1 focus. Unfortunately, these cameras are not practical for personal use. We believe that clinicians need 1:1 magnification power to present, as realistically as possible, the progress of onychomycosis to the patient and the physician. Figures 1 and 2 represent pictures taken with the Dine Instant Print camera. Figure 2 is somewhat overexposed, but it still provides satisfactory proof of significant clinical improvement for both the patient and the physician.

Conventional photography camera—Figures 3 and 4 were taken with a conventional photography camera. Figure 4 shows a patient with severe inflammatory tinea capitis (kerion) at the time of diagnosis. On evaluation of the market, we found the Canon EOS Rebel G, with a Sigma AF Macro 90-mm lens, available with an attachable macro close-up lens for 1:1 magnification or greater, to be simple and compact. This camera costs a little more than $600. If the on-the-spot picture availability that is offered by the Polaroid camera is not a must, this camera fits our criteria for daily office use.

Digital camera—There are many digital cameras on the market. Sasson, Schiff, and Stiller were among the first to recommend the use of digital cameras for clinical dermatology.[5] Current technology has rapidly evolved to accommodate the public need for a low-cost, high-resolution, easy-to-use digital camera. We were specifically impressed with three compact digital cameras: the Olympus D-500L, Kodak DC 210, and Olympus D-600L. These cameras are able to provide the combination of focusing power and simple use per cost. The Olympus D-500L ($800) has a resolution of 1,024 x 768 pixels, which is not satisfactory for 35-mm slides, but it is good for 5 x 7-inch prints, and a macro lens is available for close-up pictures (additional cost, $20 to $30). The Kodak DC 210 ($780), has a resolution of 1,152 x 864 pixels, which is basically satisfactory for 35-mm slides and very good for 5 x 7-inch prints, and a macro lens is available for close-up pictures. The Olympus D-600L ($1,110) has a resolution of 1,280 x 1,024 pixels, which is satisfactory to good for 35-mm slides and excellent for 5 x 7-inch prints, and a macro lens is available for higher than 1:1 close-up pictures.

Conclusion

The use of photography has long been appreciated in the follow-up of multiple dysplastic nevi.[6,7] The integration of clinical photography in daily use for documenting fungal disease of the nail and its clinical progress is highly recommended. This allows for patient education and self follow-up. The easy storage (in the chart), rapid accessibility, and objective documentation of photographs make them of special importance in a large, busy practice. Physicians may use photographs to document

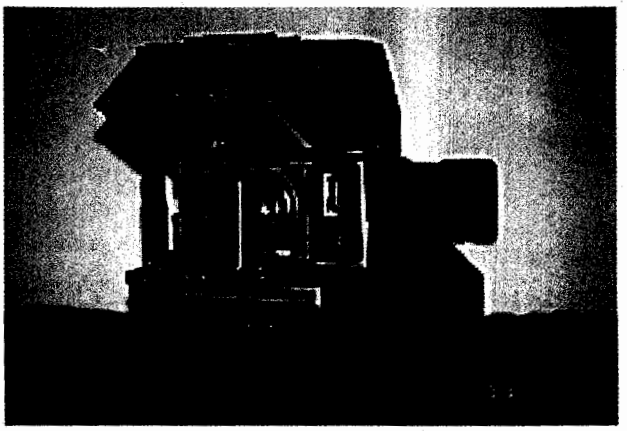


Figure 3—Photographing the nail of a patient using the Dine Instant Print Camera, Model IV.

Figure 4—A 4-year-old child with a severe form of kerion.

the progress of the treatment for the patient, especially if the treatment duration is longer than 3 months, as occurs with some nail cases, and to aid the patient in detection of early recurrence. This may provide increased patient satisfaction and faster detection of recurrence, which, in turn, may result in shorter treatment requirements. It is not necessary to follow tinea capitis with photographs, with the exception of a severe kerion, where the photograph may be the only objective proof of the diagnosis because the fungi may, at times, be absent on both the culture and microscopic examination,[9,10] and since a kerion may lead to scarring.[11]

Selected Readings

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