



Wound Sleuth

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Thickened and Black Toenails: What's the Cause?

A 59-year-old semi-retired accountant noticed black toenails (Figure 1) over the past three months. His toenails were abnormal despite six months of oral terbinafine 250 mg and subsequent topical efinaconazole 10%. He was concerned about a melanoma.

Questions for the Reader

Q What is the cause/diagnosis, and how would you investigate this patient?

A Only half of toenail abnormalities are fungus. Oral agents should be used **ONLY** after a positive potassium hydroxide microscopic mount for fungus examination is documented. Samples of nails should include subungual debris that will contain the greatest fungal load. Alternatively, the culture should grow a true dermatophyte fungus (e.g., *Trichophyton rubrum*). A positive result of

either test, along with the presence of clinical features, is enough evidence to treat for fungus. Up to three samples may need to be obtained if the clinical picture of distal streaking or whole nail plate involvement is noted. If three samples are negative, alternative causes should be considered.

In the history, he received six months of oral treatment. Four months is adequate. He had been treated with *no clinical improvement or confirmatory fungal microscopic or culture laboratory evaluations*.

It takes a toenail two years to grow from the matrix at the proximal nail fold to the distal nail plate position (approximately 1 mm a month). Repeat cultures on oral therapy can determine if

the fungus has been adequately treated, and the proximal nail is beginning to appear normal.

Q How do you rule out a melanoma?

A Melanomas under the nail plate show irregular or black pigment. The significant indicator is that the melanoma cells extend onto the skin of the nail fold (Hutchinson's sign), as outlined in Figure 2.

Q What other diagnoses/causes would you consider?



Figure 1: Abnormal 2nd, 3rd and 4th toes



Figure 2: Melanoma cells extending beyond nail fold

A We have ruled out fungal infection and melanoma. We need to consider trauma. He is a jogger and a golfer. He was wearing excellent deep-toed running shoes (Figure 3). However, his golf shoes had a narrow and shallow toe box (Figure 4).

Q How do you determine that a shoe fits properly?

A Place a large piece of paper on the floor and have the patient stand on it. While the patient is weight-bearing,

use a felt pen to draw the outline of the foot on the paper. Figures 4 and 5 demonstrate how, upon examination of the tracing of this patient's foot, it becomes obvious that the golf shoe is not adequate to accommodate the foot without pressure. The toe box is too narrow. This method illustrates to both clinician and patient when the shoe is too small for the foot.

Conclusion

This is a traumatic injury, not fungal infection or melanoma, with both feet showing hemorrhage between the nail and the nail bed. The deep-toed runner is adequate to prevent trauma while jogging. However, the

golf shoe is too small, and with each golf swing, there is both friction-surface trauma between the shoe and the distal nail, and trauma as the foot rotates through the swing motion. The hemorrhage can be documented by clipping the overlying nail; it will rest between the clipped nail and the nail bed.


A tracing is a simple and effective way to determine a proper fit of shoes. Shoes should have enough width to accommodate the foot on a tracing without a visible line outside the shoe. This is especially important in the toe box, where there should be a finger's breadth between the most distal toe and the end of the shoe. The heel should be snug enough to hold the foot in place. If calluses are noted, they indicate increased pressure, and inserts or orthotics should be prescribed by an orthotist, chiropodist or podiatrist. 



Figure 3: The running shoe



Figure 4: The golf shoe



Figure 5: The foot tracing compared with the golf shoe