Clinical and Educational Gaps in Diagnosis of Nail Disorders

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• Nail surgery • Nail biopsy • Nail disorders • Nail dystrophy

KEY POINTS
• Improving resident exposure to diverse nail disease processes and diagnostic procedures will initially require creativity to increase experience with limited exposure.
• The main hurdle to overcome in increasing resident exposure to nail pathology/procedure is simply the current low volume seen in some residencies.
• Although the capacity and desire of residencies to handle nail procedures increases over time, other modes of experience may aid in building confidence among residents.

PRACTICE AND EDUCATIONAL GAPS IN DISORDERS OF THE NAILS IN DERMATOLOGY

Introduction
Dermatologists are experts in the care of skin, hair and nails, yet many dermatologists find nails challenging and even frustrating. Nail disorders are sometimes considered trivial, and nail procedures can be labor intensive and poorly reimbursed compared with many other skin procedures. Well-recognized disease processes on the skin may seem clinically different when involving the nail unit; nail biopsies are more involved and take longer than skin biopsies, and the slow growth of nails results in a longer wait to evaluate the treatment effect than on the skin. Furthermore, our collective knowledge of the basic science of structure, function, and pathophysiology of the nail unit lags behind that of the hair follicle, adnexal structures, and skin. Research in nails is a growing field with new interest in nail matrix stem cell potential. However, clinical and surgical nail experience in resident education continues to lag, resulting in limited nail differential diagnoses in clinical practice, potential for missed or misdiagnosed nail disease, and lack of confidence in performing nail biopsies.

PRACTICE GAPS IN CLINICAL DERMATOLOGY: DIAGNOSIS OF NAIL PATHOLOGY

Best Practice
1. Dermatologists are able to diagnose the full spectrum of nail diseases, including infectious, neoplastic, congenital, inflammatory, traumatic, and those associated with systemic disease in a timely manner.
2. Dermatologists are confident in performing diagnostic nail surgical procedures; they know when, where, why, and how to perform a nail biopsy.

Current Clinical Practice
Current clinical practice gaps in diagnosing nail problems stem from a lack of appreciation of the

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broad range of nail diagnoses as well as a lack of knowledge of clinical and procedural techniques for diagnosis of nail disease processes, leading to discomfort surrounding diagnosis and management of complex nail disorders. Although 50% of nail conditions seen in a general medical dermatology office are fungal, the other 50% are something other than fungal, including neoplastic, inflammatory, congenital, traumatic, or related to systemic disease. Because some of these nonfungal conditions resemble onychomycosis clinically, they may be consequently initially misdiagnosed and even treated, exposing patients to unnecessary systemic antifungal drugs and possibly delaying important diagnosis. Further delay ensues when patients are referred outside our specialty for fingernail or toenail procedures, which are not infrequent occurrences in busy clinics when dermatologists are either not interested or not confident in treating nail disorders and performing nail biopsies.

The knowledge and attitude gap: delay in diagnosis of nail conditions

Lack of appreciation of the number and wide variety of nail disorders leads to an early limited differential and sometimes dismissal, when instead the initial differential should be broad and properly explored. This clinical practice gap spans both attitude toward and knowledge of nail physiology and the breadth of nail disease processes. For example, there is overall a lack of knowledge of the proper differential diagnosis and workup of nail dyschromia. Longitudinal melanonychia and longitudinal erythronychia can be the result of a benign or malignant process. Subungual melanomas and squamous cell carcinoma of the nail unit may present subtly with only onycholysis or longitudinal dyschromia and, consequently, are often unrecognized early (Figs. 1 and 2). Malignant tumors of the nail, although uncommon, are often advanced when diagnosed because the early signs were not recognized and the nail was not biopsied in a timely manner. The consideration, workup, and treatment of these less-common but high-stakes conditions are crucial elements of good patient care in dermatology.

Narrowing the Gap

Current gaps in clinical nail diseases diagnosis can be significantly narrowed with a 2-pronged approach to address both knowledge and attitude. Clinical diagnosis, including maintaining a broad early differential and appropriately considering harmful disease processes would improve with a standardized approach to nail disease diagnosis. Algorithms that use clinical signs and symptoms of an abnormal nail to arrive at the correct diagnosis for a wide range of nail disorders could significantly improve the aforementioned practice gaps. An algorithmic approach to nail diagnosis should strictly adhere to the core principles of confirming the presence of organisms before diagnosing onychomycosis and encourage diligent consideration of other possible diagnoses until the organism is definitively noted. Algorithms that use examination and history of nail disease signs and symptoms to assist with diagnosis and clinical decision-making are currently lacking. Gaps in attitude regarding the importance of nail conditions could be addressed by increased didactic nail sessions at the American Academy of Dermatology and other regional meetings as well as further assessment of nail burden of disease, using

Fig. 1. Amelanotic melanoma of the nail bed presenting as onycholysis and treated as an infection for 2 years before nail biopsy.
electronic medical record data, in the clinic patient population. This increased focus and evaluation would highlight the important place of nail disease diagnosis in best practice in clinical dermatology.

The skill and attitude gap: confidence in knowing when, where, and how to perform diagnostic and therapeutic nail surgical procedures

Monodactylous nail disorders must be considered potentially neoplastic. Confidence, knowledge, and interest regarding nail biopsy once neoplasm is suspected is the next step in the timely diagnosis of nail pathologic process (see Figs. 1 and 2). This gap encompasses skill (in knowing when and how to biopsy) and attitude (the recognition that this is an important aspect of clinical dermatology practice). Many neoplastic nail disorders are referred out to hand surgeons and podiatrists because of the lack of interest or confidence in performing nail biopsies in the clinic, resulting in a delay in diagnosis. Current skill and attitude gaps regarding nail diagnostic procedures stems partly from our limited knowledge of nail physiology. A firm understanding of the anatomy of the nail unit and how location of the pathologic process in the nail unit drives characteristic clinical features of a nail problem is underappreciated. Knowledge of nail physiology assists with knowing when and where to biopsy a dystrophic nail by understanding that abnormalities in certain areas of the nail unit yields characteristic clinical features. For example, pitting and leukonychia are caused by identical disease process in the proximal and distal nail matrix, respectively. Unfortunately, many nails are biopsied in the wrong location in the nail unit and abnormality miss important evidence of the disease process. Even more than in the skin, biopsy of the correct part of a nail lesion is crucial for correct diagnosis. With current basic science of the nail lagging behind that of other adnexal structures, confidence in our knowledge of causative factors in nail disease naturally wavers. Understanding nail growth kinetics and the properties and interactions between the nail matrix and the nail bed are crucial for a logical diagnosis.

Narrowing the Gap

Improving knowledge of nail physiology is the first step in increasing our confidence in the diagnosis of diseases of the nail unit pathologic processes, yet currently there is little focus on nail physiology in either basic science or resident education. Steps to narrow this knowledge gap and, thus, increase confidence in clinic-performed diagnostic procedures can be taken in both the basic science realm and in education. Exploration of the potential of nail matrix stem cells both increases our knowledge of pathologic nail processes as well as brings a greater awareness and appreciation to the basic anatomy and physiology of the nail. Increased emphasis in resident education on nail procedures will be crucial for narrowing this procedural gap over time (see later discussion). Increased didactic sessions at the medical meetings, cadaver dissection of digits, and live nail surgery demonstrations can start to narrow this gap in current practice, bringing confidence to clinical diagnosis and diagnostic procedures.

EDUCATIONAL GAP (IN DERMATOLOGY RESIDENCY EDUCATION)

Best Practice

1. Dermatology residents should have sufficient experience with a wide variety of nail conditions
during their residency to be able to diagnose and treat any nail condition.

2. Dermatology residents should have adequate nail surgery experience during residency to be comfortable knowing when, why, where, and how to perform a nail biopsy on an ambiguous nail dystrophy.

**Current Practice: Lack of Resident Exposure to Nail Disease Diagnosis and Diagnostic Procedures**

Many dermatologists do not have the training and experience to perform nail procedures confidently. This training and experience should begin in residency. Currently there is a wide spectrum of exposure to nail disease and diagnosis in residency, but overall exposure remains inadequate to build confidence surrounding nails in clinical practice. Residents are often not taught how to work up a nail dystrophy to arrive at a differential diagnosis based on history and clinical nail morphology. Further, they are often not taught to use clinical morphology to determine the location and method of biopsy. Finally, lack of exposure to adequate nail procedures during residency precludes confidence in performing nail procedures.

**Assessing the Gap**

Some residents receive insufficient hands-on experience performing nail procedures, resulting in a practice-based learning gap. Few training programs have a nail expert on the faculty, and often there is little identification of the nail as a specialized area of diagnosis and procedure. Workup and diagnosis of nail disease are often taught in a piecemeal fashion within other categories of dermatology with little focus on using knowledge of nail physiology to aid in diagnosis. Residents may have less exposure to nail disease when cases are referred to community physicians with a nail specialty or to fields outside of dermatology, such as hand surgeons or podiatrists. For a variety of reasons, resident exposure to nail disease workup and biopsy is lacking, limiting practice-based learning in residency.

As the number of procedures performed by dermatologists has increased, over the past 15 years there has been an increase in requirements to ensure adequate procedural training during residency. Despite the increased focus on procedural dermatology, there remains a dearth of nail surgery experience in residency education. Based on a survey in 2009 of 240 third-year residents representing 89% of all US dermatology residency programs, only 10% of respondents performed greater than 10 nail procedures during their residency, 25% had only observed nail procedures, and 4% were exposed to nail procedures only via lecture. Thirty-three percent of residents performed fewer than 5 nerve blocks of any type. Thirty percent rated themselves not competent to perform nail surgery (only surgery with flaps and grafts yielded lower confidence). Yet when surveyed, greater than 75% of respondents in a survey of residents in 2004 rated nail biopsy as an essential procedure to learn in residency.

**Narrowing the Gap**

Improving resident exposure to diverse nail diseases processes and diagnostic procedures will initially require creativity to increase experience with limited exposure. The main hurdle to overcome in increasing resident exposure to nail disease and diagnostic procedures is simply the current low volume seen in some residencies. In time it will be important to reverse this trend by starting to do more nail procedures. Although the capacity and desire of residencies to handle nail procedures increases over time, other modes of experience may aid in building confidence among residents. Some residency programs are now using cadaver nails or artificial nail models to teach residents nail surgery techniques. Other programs that do not have a nail specialist on faculty have affiliated with community dermatologists to increase resident exposure.

**REFERENCES**