

Views and Practice

Mastering basic nail procedures

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Summary

Examination and surgical intervention of nail unit lesions are often hindered by its natural hard keratinous nail plate. Knowledge of the basic anatomy of a nail unit and surgical pathology of a condition facilitate the delivery of an appropriate and effective treatment. The mild form of common ingrown toenail can be managed by tube insertion which entails inserting without anaesthesia a small calibre plastic tube along the ingrown part. It often gives immediate symptomatic relief and may obviate the need of later surgical intervention. A nail elevator is a good tool for nail plate avulsion, especially useful in dealing with a thickened nail which often imposes difficulty for clinicians to offer effective medical treatment. Exploration of a nail involves partial or complete removal of a nail plate, and/or reflection of the proximal/lateral nail fold thereby exposing the nail bed and nail matrix. The incision line on the lesion is influenced by the location and spatial orientation in respect of nail bed and nail matrix. Clear visualization of the nail bed or matrix is dependent on a bloodless

operating field. A well applied digital tourniquet is indispensable for one to achieve a bloodless field.

Introduction

The human finger and toe nails not only reinforce physical protection and confers a nice look, it also provides an encounter pressure against objects felt on the distal phalangeal pad, thereby enabling precise digital (finger) gripping. The Nail Plate (NP) is curved in the longitudinal and transverse orientations and thus it is biconcave. The finger nail grows distally at a rate of about 0.1 mm per day while the toenail grows more slowly in half to one-third of this rate. The NP is produced mostly by continued growth of Nail Matrix (NM) which contributes to its formation. The Nail Bed (NB) also contributes but much less to the NP formation in about 5-10 percents. Histology of a longitudinal nail biopsy showed that the NM is shaped V which opens towards the free end of the NP. The NM is arbitrarily divided into 3 parts, the dorsal, intermediate and ventral (distal) matrices, contributing to the dorsal, mid, and ventral portions of a NP respectively. The ventral matrix is said to correspond to the lunula seen externally. In the finger nail, the matrix may extend to a three-quarter distance from the nail fold to the distal interphalangeal joint crease.¹ Sometimes, the matrix may have a posterolateral extension (or horn), when anticipating surgical matricetomy in ingrown toenail (IGTN), this part should also be removed to avoid regrowth of nail spicule.

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Procedures

Tube insertion: a non-invasive treatment of simple IGTN

Simple in "simple IGTN" means that the nail is not congenitally abnormal and the ingrown is not consequent to or complicated by an infection, nor is there an excessive granulation tissue. In the author's experience, many early cases of IGTN belong to this group. This is also labeled as Stage 1 IGTN which is characterized by erythema with only slight edema but no infection or excessive granulation tissue. Many clinicians treat this stage of IGTN conservatively with warm soaks, topical antibiotics, or insertion of cotton wool pledget or dental floss.² Insertion of a tube splint (similar procedure named as gutter treatment by Murray WR³) is non invasive, it will not create a wound or cause bleeding. No anaesthesia is needed. What a clinician needs is a small clean plastic tube. This can be made by splitting a CH 08 sterile Nelaton catheter or some other similar material. The affected nail is cleansed with Aqueous Hibitane, and then insert the tube with the split side accommodates the lateral edge of the nail plate (Figure 1). This splint is pushed gently with some pressure along the lateral nail fold as far proximal as possible. The technique is simple and the detail is described elsewhere.⁴



Figure 1. Bilateral ingrown big toe nails. The nail plate edges are sleeved by plastic tubes.

Nail avulsion

In my practice, the procedure is useful in 3 situations: in onychomycosis, in thickened nail not responding to topical treatment and in the exploration for nail apparatus pathology. In patients with suspected onychomycosis but repeated clipping of nail did not reveal any microscopic or cultural features of fungal infection, nail avulsion and sending nail plate for histological examination with PAS stain may shed light to the diagnosis. For onychomycosis already confirmed microbiologically, it is known that a thickened onychomycotic toenail is less responsive to even prolonged systemic antifungal agents. Removal of a grossly diseased nail and trimming away of any diseased nail bed tissue in this situation serves to debulk the disease load, thereby enhancing subsequent topical and/or systemic therapy. Nail avulsion is also a surgical therapy for a thickened and disfigured nail not responding to topical and/or systemic therapy irrespective of the underlying cause. Lastly, removal of whole or a part of a NP is needed to facilitate exploration for a NB or NM pathology.

Like other surgical procedures, patients with bleeding diathesis should have the clotting profile corrected before surgery. While immunosuppression and peripheral vascular disease carry a theoretical increased risk of morbidity, the procedure is not absolutely contraindicated in these patients, in fact, immunosuppressed patients may give a poorer response to medical therapy for onychomycosis and surgical treatment in them for single nail disease becomes the treatment of choice. Based on my experience on a few tens of patients (unpublished data), there are no significant post-operative complications other than pain but none of these patients had preceding vascular compromise. Clinicians should evaluate every case and assess for a balance between the risk and benefit.

Often, complete nail avulsion is performed for an onychomycotic toenail. Removal of a NP is easy but full explanation on the pros and cons of the

procedure should be given to all patients who are initially often scared to hear about the procedure and worry that the procedure would cause significant pain and permanent disability. I usually compare the procedure to a tooth extraction and that loss of a tooth is permanent while replenishment of a NP after a nail avulsion is the rule.

Plain 2% lignocaine contained in an insulin syringe is sufficient. Do a ring block anaesthesia with supplemental dose on the proximal and lateral nail folds if necessary. In most cases, 1 millilitre of the local anaesthesia is sufficient for one nail. No adrenaline or tourniquet is needed. A nail elevator or dental spatula is preferred by me and is useful in surgical avulsion. However, there are advocates for the use of a mosquito hemostat.⁵ First, insert the nail elevator to free the dorsal nail plate from the PNF. The next step is to free the NP from the underlying NB and NM, and from the lateral nail fold. After the NP is freed, it is grasped by a hemostat or a needle holder. The NP is rocked side to side for complete removal. A small scissors may be used to cut the residual soft tissue attachment. The distal approach procedure is commonly used, i.e., the elevator is inserted at the hyponychium to reach the distal NP-NB interface. However, in the event that there is gross distal subungual hyperkeratosis hindering insertion of the elevator, the proximal approach can be adopted. The nail elevator separates the proximal nail fold from the NP, then insert from beneath the PNF to separate the nail plate from the nail matrix. This approach may cause more trauma to the NM and should be used only when the distal approach is not suitable.

Exploration of the NB and NM

Removal of part or whole of the hard keratinous NP exposes underlying NB and NM tissue, thereby facilitating further procedural management. Using a hot biopsy punch to drill a hole in the NP to gain access to a subungual lesion is advocated by some and written in books. However, I do not find the procedure easy or successful using the facilities that are commonly found in most clinics.

The use of an English nail splitter eases cutting and removal of a NP. Next, when incision is to be done on the NB, a longitudinal incision produces the least damage to the NB tissue compared to a transverse one; on the other hand, a transverse incision on the nail matrix rather than a longitudinal one would result in the least damage and hence lower the risk of NP deformity. A wound in the NB or NM of width less than 3 mm enables easier closure. A big wound in NB and NM requires undermining for closure, there is also higher incidence of scarring and deformity of NP. Wide excision of NB/NM requires full thickness skin grafting, which relies on the expertise of a hand surgeon.

For a longitudinal nail biopsy, it is more difficult with the NP in-situ. Therefore, in most instances, a part or whole of the NP is avulsed before the actual biopsy procedure. The extent of the incision would be dependent on the size of the lesion and the need for complete excision. For example, for chronic onycholysis, a small NB specimen is enough; but for longitudinal melanonychia, removal of the whole lesion may be contemplated (Figure 2). It is noted that a melanocytic lesion which causes a longitudinal melanonychia mostly arises in the NM, and this may extend far proximally from the PNF.

Exploration of a lesion which lies distal to the PNF needs removal of the NP. But to search for a lesion which lies deep and proximal to the PNF margin needs reflection of the latter to expose the deep



Figure 2. A good quality longitudinal nail biopsy harvesting the whole nail matrix (nail plate removed).

seated tissue. This is done by making an incision at both lateral sides of the proximal nail fold from its junction with the lateral nail fold, and extends towards the distal interphalangeal joint. The length of incision would be dependent on the need to properly expose the pathology. A 5 mm length is the minimum for good reflection. The PNF tissue can then be reflected by the help of an elevator followed by a stay suture or retractor (Figure 3).

Conclusion

Knowledge of the anatomy of the nail is important in performing nail procedures which form an integral part of nail disease management. In selected cases, nail avulsion as a single surgical procedure is a simple and safe procedure. It is especially useful in tackling grossly thickened nail in onychogryphosis and in single onychomycotic nail which fails to respond to topical and/or systemic antifungal agents. NB and NM exploration are more complex, prior skill acquired through minor skin surgery is preferred. A senior colleague should be consulted before hand whenever necessary. Like all other surgical procedures, detailed discussion should be made with the patient and information be given on the potential risk and efficacy. Finally, achieving a bloodless field is mandatory for a successful search of a nail lesion and subsequent excision. This is done by proper application of a tourniquet. A combo latex rubber glove and nylon zip tie is an effective tourniquet for nail surgery done under local anesthesia; the technique detail is described elsewhere.⁶ Removal of part or whole NP enhances visualization.

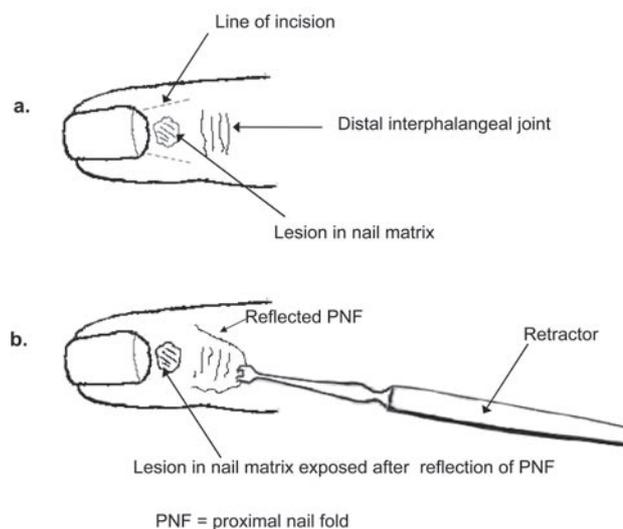


Figure 3. Simplified approach to a nail matrix lesion.

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