Nail Procedures: Best Practices and Updates

Edward J. Mayeaux, Jr., MD, FAAFP
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Edward J. Mayeaux, Jr., MD, FAAFP

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Dr. Mayeaux lives and practices in Columbia, South Carolina. He has received the American Society for Colposcopy and Cervical Pathology (ASCCP) Award of Merit three times and has also received numerous faculty teaching awards. He focuses on women's health and skin diseases, noting that the most important trends in the field are the rise and fall of methicillin-resistant *Staphylococcus aureus* (MRSA); changes in Pap test recommendations and follow-up; and changes in human papillomavirus (HPV) testing recommendations. Dr. Mayeaux considers keeping up with the rapidly changing knowledge base in medicine to be family medicine's most critical challenge. Other professional interests include health care quality, preventive medicine, and returning joy to medical practice.
Learning Objectives

1. Demonstrate common methods used for nailbed surgery and repair.

2. Illustrate the steps used to treat ingrown nails and nail abnormalities.

3. Prepare assessment and treatment plans for different patient populations who may require various nail procedures.

4. Assemble appropriate tools for nail procedures.
Nails - Introduction

- Protects distal phalanges
- Increases mechanical traction
- Enhances fine touch
- Cosmesis
- Surgical methods may be needed to diagnose and treat nail problems

Courtesy of Dr. E.J. Mayeaux, Jr.
Normal Nail Anatomy

- **Nail plate**
  - Hard, flexible
  - “The nail”
  - Keratinized sq. cells
  - Borders - proximal and lateral nail folds
  - Longitudinal grooves on dorsal surface


Courtesy of Dr. E.J. Mayeaux, Jr.
Normal Nail Anatomy

- **Nail bed**
  - Highly vascular
  - Longitudinal ridges interdigitates with nail bed
  - Borders lunula, lateral nail folds, and hyponychium

Normal Nail Anatomy

• **Nail matrix**
  – **Germinal center**
  – Proximal produces dorsal nail
    • 80% of plate - causes curvature
  – Proximal nail fold covers most of matrix
  – Visible part is **lunula**
  – Melanocytes absent in nail bed


Courtesy of Dr. E.J. Mayeaux, Jr., M.D
Normal Nail Anatomy

- **Anterior ligament** attaches distal phalanx to the hyponychium
- **Posterior ligament** attaches matrix and proximal fold to distal phalanx


Courtesy of Dr. E.J. Mayeaux, Jr., M.D
Digital Ring Block

- Anesthesia for variety of nail procedures
- Lidocaine **without** epinephrine?
  - Doesn’t matter in most people
- Use 27-30 gauge needle, HCO₃ and slow injection to minimize pain
- Anesthesia in **5 to 10 min**
- **Luer lock** syringe

Lidocaine + 1:200,000 Epinephrine

• Comprehensive medical literature reviews of >10,000 surgical procedures and large observational studies have failed to find any reports of gangrene or major ischemic complications attributable to lidocaine with epinephrine\(^1\)-\(^5\)
  – Doppler study - vasoconstrictive effects resolve within 90 minutes\(^6\)

• Epinephrine with lidocaine leads to faster onset and longer duration of anesthesia without negative vascular sequela\(^7\)

Digital Ring Block

- Prep
- Raise a weal?
- Direct needle toward plantar surface on medial side
- Inject 1-2 cc on return

Courtesy of Dr. E.J. Mayeaux, Jr.
The Essential Guide to Primary Care Procedures 2nd ed. 2015
Digital Ring Block

• Without leaving skin, redirect across top of digit
• Inject 1-2 ml on return

The Essential Guide to Primary Care Procedures 2nd ed. 2015

Courtesy of Dr. E.J. Mayeaux, Jr.
Digital Ring Block

• On the lateral side, direct needle toward plantar surface
• Inject 1-2 cc on return
Digital Ring Block

• For smaller digits, a single injection hole may be used to inject down both sides
• Tenting the skin makes entry of needle easier
Digital Ring Block

• Insert the needle to the bone, and infuse anesthetic
• Angle the needle and inject volarly & dorsally
• Repeat this technique on the opposite side
Wing Block Procedure

- Hold the needle perpendicular to the long axis of the digit and at 45 degrees to the plane of the hand
- Insert the needle 3 mm proximal to the proximal nail fold
- Inject the anesthetic along the proximal nail fold
- Slowly withdraw the needle and redirect it toward the lateral nail fold
- May need to performed on the opposite side of the nail

Nail Removal

• Ingrown toenail (*Onychocryptosis*)
  – Most common reason
  – Improper *fit of nail plate* in lateral groves
  – Significant discomfort
  – *Great toe* usually
  – Foreign body reaction – appears infected
    • Abx do not change outcomes

Ingrown Nail

• Onychocryptosis or Unguis incarnates
• Commonly treated in primary care
• Periungual skin of lateral nail folds is traumatized by adjacent nail plate, resulting in an inflammatory foreign body reaction.
• Painful, draining, foul-smelling lesion and hypertrophy of the involved folds.

2. Eekhof JAH, Cochrane Database of Systematic Reviews 2012.
Risk Factors

- Behavioral risk factors
  - Improper nail plate trimming
  - Wearing constricting footwear
  - Repetitive toe trauma
- Anatomic variations
  - Disproportionate plate width
  - Excessive nail plate thickness and curvature
  - Rotation of the distal phalange
  - Heavy nail folds
  - NOT wider nail folds and thinner, flatter nails

- Physiologic risk factors
  - Plantar hyperhidrosis
  - Diabetes
  - Obesity
  - Cardiac disorders*
  - Renal disorders*
  - Thyroid disorders*

*Predisposes to lower extremity edema

Trimming Nail Plates

No!  No!  No!  No!  Yes!
Palliative Measures

- Elevation of nail edge
- Selective trimming
- Frequent soaking
- Oral or topical abx
- Loose footwear
- Resolution rare without removal
Ingrown Toenails Clinical Stages

I – mild
Nail-fold swelling, edema, erythema, and pain (with pressure), resulting from the nail plate puncturing the skin

II - moderate
Additional finding of inflammatory granuloma tissue and seropurulent discharge; infection; and sometimes ulceration of the nail fold

III - severe
Chronic inflammation, the formation of epithelialized granulation tissue, and sometimes marked nail-fold hypertrophy
Ingrown Toenail Treatment

- Assumed to persist or progress if not properly treated
- Indications = pain, secondary infection, onychogryphosis, or paronychia
- Contraindications allergy to anesthetics, PVD, uncooperative patient or bleeding diathesis (relative)
- Phenol exposure is contraindicated in pregnancy
- Relative contraindications to chemical matrixectomy include uncontrolled DM and PVD
Ingrown Toenail Treatment

- Nonsurgical and surgical treatment options available
  - Non-surgical treatments - mild or moderate stage
  - Surgical treatments - moderate and severe cases
- Surgical < non-surgical interventions for recurrence
- Antibiotics before or after tx do not improve outcomes
- Postoperative manuka honey, povidone-iodine, hydrogel with paraffin, or paraffin gauze = infection rates, pain, healing time
- Phenol matrixectomy significantly more effective in preventing recurrence than matrix excision

Nonsurgical Treatments

- Footwear - open toe or wide toe box
- Manage hyperhidrosis & onychomycosis
- Soaking & apply mid-potency steroid 3 times daily for 2-14 days
- Wisps of cotton or dental floss under edge
- Gutter splint with anesthesia
- Cotton nail cast
- Nail fold taping
- Phenol, NaOH, or silver nitrate cautery of hypertrophied lateral tissue
- Orthonyxia (brace treatment)
Gutter Splint Treatment

- Cut a small vinyl or plastic tube from top to bottom
- Place over the side of the ingrowing plate and affixing with tape, glue or sutures
- May also place cotton then cyanoacrylate
- Separates the nail plate from the nail fold preventing it from growing into the skin

Tape Method

• Involves placing the adhesive band on the affected fold and pulling it under and the across the toe to reduce the pressure of the nail fold and the edge of the nail plate.
Surgical Treatments

• Goal is to remove the interaction between the nail plate and the fold to eliminate trauma and foreign body reaction\(^1\)
  – excising all or part of the nail plate
  – excising all or part of the nail fold

• Most common procedure is partial avulsion of the lateral edge of the nail plate +/- lateral horn matrixectomy

• When possible, partial nail plate avulsion is preferred to complete avulsion because it minimizes trauma to the adjacent tissues.\(^2\)

Surgical Treatments

- Partial nail avulsion +/- partial matrixectomy (Ross procedure)
- Wedge excision, wedge segmental excision, or wedge resection with nail matrix destruction (Winograd procedure)
- Total nail avulsion +/- excision of granuloma +/- total excision of the matrix (Zadik procedure)
- Rotational flap of the nail fold
- Radical nail fold excision (Vandenbos procedure)
- Most common procedure is partial avulsion +/- lateral horn matrixectomy
Nail Removal Indications

• Onychocryptosis (ingrown nail)
• Onychomycosis (fungal infection)
• Pincer Nail
• Onychogryposis (deformed, curved nail)
• Chronic, recurrent paronychia (inflammation of nail fold)
Nail Removal Contraindications

- **Allergy** to local anesthetics
- **Bleeding diathesis**
- **Diabetes**
- **Ablation of lateral germinal matrix** to lower the recurrence rate - less commonly used for patients with PVD, diabetes, or collagen vascular disease
Tools

• **Cut**
  – Flat pointed blade of scissors
  – Nail Splitter

• **Grasp**
  – Single jaw of straight hemostat
  – Narrow periosteal elevator
  – Needle driver

Courtesy of Dr. E.J. Mayeaux, Jr.
Nail Removal Technique

• Patient in relaxed, supine position
• Scrub
• Drape?
• Digital ring-block
• Use a hemostat to firmly secure a wide rubber band ("tourniquet") around base of toe?
Nail Removal Technique

• **Tunnel** under nail edge
• Always use **upward pressure** to minimize injury to nail bed and bleeding
• Tunnel to ventral fold
• **Push cuticle back**
Nail Removal Technique

• **Grasp** along edge with a straight hemostat

• **Use a rocking rotation** of the nail plate to remove off the nail bed
Nail Removal Technique

• **Cut** off lateral edge if partial avulsion
• **Use** scissors or nail splitter
• **Separate** at least 25-30% of the nail
Nail Removal Techniques

• Make sure all of the expected nail plate has been removed
• If part is ‘missing’, explore the nail bed and remove any left behind

Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Removal Techniques

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Courtesy of Dr. E.J. Mayeurx, Jr., M.D.
Phenol Matrixectomy

- Apply 80%-88% phenol with slightly moistened cotton tipped applicator or flat toothpick only to the matrix
- Apply at the lateral sulcus and under the proximal fold 2 – 3 times for 30-60 seconds each
- Rinse with 70% isopropyl alcohol or saline
- Contraindicated if anyone may be pregnant

NaOH Matrixectomy

• Apply 10% NaOH with a cotton tipped applicator.
• Vigorously rub onto the lateral horn of the nail matrix for 1 minute.
• Prevent contact with surrounding structures as this could cause more extensive damage than intended and delay wound healing.
• Thoroughly rinse with 70% isopropyl alcohol or saline to neutralize

# Nail Matrix Phenolization Recurrence Rates

<table>
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<tr>
<th>Author, Year</th>
<th>Number</th>
<th>Follow-up (mo)</th>
<th>Recurrence Rate (%)</th>
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</table>
EBM Recommendation

• Surgical interventions are more effective than non-surgical interventions in preventing the recurrence of an ingrowing toenail. In the studies comparing a surgical intervention to a surgical intervention with the application of phenol, the addition of phenol is probably more effective in preventing recurrence and regrowth of the ingrowing toenail.

Radiofrequency Nail Ablation

- Place grounding antenna under heel
- "Hemo-part rect" or "coagulation"
- Insert an insulated matrixectomy tip over the nail matrix (extending under proximal nail fold), insulated side up
- Slight upward pressure to produce a gap
Radiofrequency Nail Ablation

• Apply power and slowly withdraw electrode for 5-10 seconds
• May be repeated once after 10-15 seconds
• Skin loop may be used to destroy hypertrophied lateral fold

Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Electrocoagulation Ablation

- Place point electrode into the matrix, apply power, and **slowly** withdraw the electrode.
Nail Removal Techniques

Petrolatum, NOT topical antibiotic

Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Removal Techniques

© Dr. Richard Usatine

Courtesy of The Essential Guide to Primary Care Procedures and Dr. E.J. Mayeaux, Jr., M.D.
Chemical Nail Avulsion

• 40% Urea ointment applied to the affected nail under occlusion for 7 days
• The nail is removed atraumatically
• Painless, involves no blood loss, and is less expensive than surgical avulsion
  – Urea ointment paste = 40% urea, 5% white beeswax or paraffin, 20% anhydrous lanolin, and 35% white petrolatum
  – Ureacin-40 ointment OTC

Nail Removal Postprocedure

• **Elevate** during first 12 to 24 hrs
  – Pain should be absent with phenol
  – Minimal pain with radiofrequency tx

• **Change dressing** every 24 hours

• Normal ambulation

• Sterile exudate for several weeks

• **Soak and clean** in warm water and apply *petrolatum* until healed

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Nail Removal Complications

- **Infections** (treat with soaks and appropriate antibiotics)
  - Mg Salts?
- **Regrowth** of nail and return of symptoms
- Incomplete matrixectomy = recurrence
- If the toe is healing poorly several weeks after the procedure, debridement, oral antibiotics, and radiographic evaluation may be warranted
- Rarely, permanent loss of nail plate, nail plate dystrophy, or pyogenic granuloma may occur

Nail Plate and Bed Biopsy

- Many benign causes of pigmented nail plate streaks
- Malignant melanomas
  - 3.5% of all cutaneous MMs (15% to 20% in blacks)
- Distinction between benign & malignant difficult
- Biopsy often necessary

Skin Cancer Foundation
Nail Bx Indications

• Longitudinal pigmented linear streak in the nail plate suspicious for malignancy
• Diagnosis of tumors
• Thickened, distorted nail plate with a negative evaluation for fungal infection (KOH scraping, culture)
Nail Bx Contraindications

• Long. melanonychia with periungual pigmentation (Hutchinson's sign)
  – High risk of melanoma
  – Refer for biopsy and radical excision
• Allergy or sensitivity to local anesthetics
• Bleeding diathesis

Courtesy of The Color Atlas of Family Medicine
Nail Plate Biopsy Technique

- Hold the punch **perpendicular** to nail
- Rotation of the punch (painless)
  - **Ring block** for anesthesia
- Separate from underlying nail bed

Nail Bed Biopsy Techniques

- 2 options
- Punch biopsy through the nail plate
- Longitudinal nail bed biopsy with partial nail avulsion


Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Bed Biopsy Technique #1

- Place over area to be biopsied and twist
- Use a large punch to bore through nail plate
- Remove the core
- Use a smaller punch to obtain sample


Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Bed Biopsy Technique #1

- Use a needle or smooth pick-ups to lift and sharply dissect sample
- Place in formalin

Nail Bed Biopsy Techniques

• May close with 1-2 5-0 or 6-0 nylon sutures
  – Optional for nail bed
  – Always use sutures on matrix
• Apply petrolatum and gauze

Nail Matrix Biopsy

• Incisions are made in the lateral part of the proximal nail fold which is reflected

Courtesy of Dr. E.J. Mayeaux, Jr.
Nail Matrix Biopsy #1

• Nail plate is avulsed
• Fusiform (elliptical) excision OR shave biopsy
• Suture fusiform


Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Matrix Biopsy #2

• Nail plate is avulsed
• Shave of Pigmented area


Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Matrix Biopsy

• The nail plate is replaced to prevent adhesions and the proximal fold sutured


Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Nail Bed Bx Complications

- Bleeding
- Infection

Courtesy of Dr. E.J. Mayeaux, Jr.
Subungual Hematoma Evacuation

• Common response to injuries
  – Direct blow to the fingernail causing bleeding into space between nail and nail bed

Courtesy of Dr. E.J. Mayeaux, Jr.
Subungual Hematoma Evacuation

• Intense pain from pressure
  – Evacuation = pain relief
  – Consider distal digit X-rays with large hematomas

Courtesy of The Color Atlas of Family Medicine and Dr. E.J. Mayeaux, Jr., M.D.
Evacuation Indications

• Visible, painful hematoma beneath the involved nail

Ouch!

Courtesy of Dr. E.J. Mayeaux, Jr.
Evacuation Contraindications

- Crushed or fractured nail \(^1,2\)
- Hematomas involving >50% of nail may indicate laceration of the bed
  - Removal of the nail and repair of the laceration recommended by some
  - Others recommend leaving nail in place as a splint
  - Creation of open fracture?
  - No difference in cosmetic outcome with nail bed repair and simple decompression \(^3\)

Evacuation Technique

• Put hole directly over the hematoma
• Cautery method
  – Activate the cautery and apply the tip to the nail to create a hole

Courtesy of Dr. E.J. Mayeaux, Jr.
Evacuation Technique

• Heated tip will be cooled by the hematoma upon perforation, preventing injury to nail bed
• Hole should be 1 to 2 mm so as not to self-close within a few hours
• Elevation of the finger, cool compresses, and a simple bandage during the first 12 hours
Evacuation Technique

• Paper-clip method
  – Wash digit
  – Put hole directly over hematoma
  – Partially straighten a metal paper clip, grasp it with forceps
  – Heat it
Evacuation Technique

– Place heated clip firmly on nail plate

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Evacuation Technique

- Allow it to melt the tissue until the nail is completely perforated
- Withdraw paper-clip immediately after plate perforation
Evacuation Technique

Courtesy of the Essential Guide to Primary Care Procedures
Evacuation Technique

Courtesy of Dr. E.J. Mayeaux, Jr.
Hematoma Evacuation Complications

- Infection of the residual hematoma

Courtesy of Dr. E.J. Mayeaux, Jr., M.D.
Paronychia I&D

- Paronychia = nail fold inflammation
- **Acute** Paronychia is **abscess** of the nail folds
  - Produces redness, pain, and swelling
  - Gram + cocci - Strep pyogenes and pen-resistant Staph
- **Chronic paronychia** = **eczematous condition**
- Ultrasonography - fluid collection = abscess and subcutaneous cobblestoning = cellulitis

Paronychia

**Risk factors**

- Accidental trauma
- Artificial nails
- Manicures
- Manipulating a hangnail
- Occupational trauma (e.g., bartenders, housekeepers, dishwashers, laundry workers)
- Onychocryptosis (ingrown nails)
- Onychophagia (nail biting)

**Prevention**

- Apply moisturizer after hand washing
- Avoid chronic exposure to contact irritants and moisture (including cleansers)
- Avoid nail trauma, biting, picking, manipulation and finger sucking
- Avoid trimming cuticles
- Improve control of diabetes mellitus
- Keep affected areas clean and dry
- Keep nails short
- Use rubber gloves with cotton liners

Acute Paronychial I&D

- Some milder cases treated with warm soaks and topical antibiotics
- Most cases require I&D
- Antibiotics unhelpful except with cellulitis
Paronychia I&D Indications

• Visible, painful paronychia
• Contraindications: allergy to local anesthetics
  – May do without or with anesthesia
  – May anesthetize area with a refrigerant, wing block, or digital block

Paronychia I&D Technique

- Wash the digit with abx soap
- Digital ring-block
- Insert **#11 blade** (or bevel of 18 guage needle) into the most translucent part of the lesion
  
- Use a **quick, short stabbing/sweeping motion**
Paronychia I&D Technique

- Insert the blade between the nail and eponychium
  - Parallel to and flat against the plate
- Quickly sweep to open the abscess
- Express contents

Courtesy of Dr. E.J. Mayeaux, Jr.
Paronychia I&D Technique

Courtesy of The Essential Guide to Primary Care Procedures and Dr. E.J. Mayeaux, Jr., M.D.
Paronychia I&D Complications

• Bleeding

Courtesy of Dr. E.J. Mayeaux, Jr.
Paronychia I&D Technique

- Bacterial cultures usually unhelpful
- **Soak** the finger for 20 minutes TiD
  - If patient expresses any accumulated pus after each soaking, this serves the same purpose as packing
- Antibiotics do not improve cure rates even with MRSA
- Large bandage – change regularly


Courtesy of Dr. E.J. Mayeaux, Jr.
Nail Injection

- **Intralesional corticosteroid injection** into the proximal nail fold
  - Pain minimized by precooling or digital block
  - Nail bed ds = proximal injection
  - Matrix disease = fold injection
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<th>Code</th>
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<td>+11731</td>
<td>each additional nail plate (List separately in addition to code for primary procedure)</td>
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<td>Excision of nail and nail matrix, partial or complete (eg, ingrown or deformed nail), for permanent removal;</td>
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Thank you!