

Ingrown Toenail Removal

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Ingrown toenail is a common problem resulting from various etiologies including improperly trimmed nails, hyperhidrosis, and poorly fitting shoes. Patients commonly present with pain in the affected nail but with progression, drainage, infection, and difficulty walking occur. Excision of the lateral nail plate combined with lateral matricectomy is thought to provide the best chance for eradication. The lateral aspect of the nail plate is removed with preservation of the remaining healthy nail plate. Electrocautery ablation is then used to destroy the exposed nail-forming matrix, creating a new lateral nail fold. Complications of the procedure include regrowth of a nail spicule secondary to incomplete matricectomy and postoperative nail bed infection. When performed correctly, the procedure produces the greatest success in the treatment of ingrown nails. Basic soft tissue surgery and electrosurgery experience are prerequisites for learning the technique. (Am Fam Physician 2002;65:2547-50,2551-2, 2554,2557-8. Copyright© 2002 American Academy of Family Physicians.)

▶ A patient information handout on ingrown toenail removal is provided on page 2557.

"Office Procedures" forms on ingrown toenail removal are provided on pages 2551, 2552 and 2554.

This article is one in a series adapted from the Academy Collection book "Office Procedures," written for family physicians and designed to provide the essential details of commonly performed in-office procedures, and published by Lippincott Williams & Wilkins.

Ingrown toenail, or onychocryptosis, is a commonly encountered problem in family practice. Patients usually present with pain in the affected nail but with progression, drainage, infection, and difficulty walking occur. Most patients present with ingrown toenail during the second and third decades of life, but teenagers often develop ingrown toenails after tearing the corners of their toenails.

Possible causes of ingrown toenails include improperly trimmed nails, hyperhidrosis, poorly fitting footwear, trauma, subungual neoplasms, obesity, or excessive external pressure. These alterations cause the nail to improperly fit into the lateral nail groove, producing edema and inflammation of the lateral nail fold.

Stage 1 ingrown toenails are characterized by erythema, slight edema, and pain with pressure to the lateral nail fold. Stage 2 is marked by increased symptoms, drainage, and infection. Stage 3 ingrown toenails display magnified symptoms, granulation tissue, and lateral nail-fold hypertrophy.

Many physicians advocate conservative management for stage 1 ingrown toenails, including warm soaks, cotton-wick elevation of the affected nail corner, or antibiotic therapy in the presence of infection (*Table 1*). Simple, partial nail avulsion has been tried for stage 2 nails but is successful in eradicating the

condition in only 30 percent of patients. Stage 3 ingrown toenails can develop from a laterally pointing spicule of nail beneath the nail fold. Excision of the lateral nail plate combined with lateral matricectomy is believed to provide the best chance for eradication. In the treatment of stage 3 toenails, the associated granulation tissue and lateral wall hypertrophy also should be removed.

The surgical technique of lateral nail avulsion and matricectomy has achieved the greatest success in the treatment of ingrown nails. Lateral nail excision limits the amount of nail

TABLE 1
Management Options for Ingrown Toenails

Warm water soaks
Cotton-wick insertion in the lateral groove corner
Debridement (debulking) of the lateral nail groove
Silver nitrate cautery to the hypertrophied lateral nail tissue
Complete nail avulsion
Partial nail avulsion
Wedge resection of the distal nail edge
Partial nail avulsion with:
Phenol matricectomy
Sodium hydroxide matricectomy
Laser matricectomy
Electrosurgical matricectomy
Surgical excision of nail plate, nail bed, and matrix

The surgical technique of lateral nail avulsion plus matricectomy is highly successful in the treatment of patients with ingrown toenails.

removed, leaving less of an area of exposed and tender nail bed. If a laterally pointing spicule of nail is found beneath the hypertrophied tissue of the lateral nail fold, it should be removed, and a new lateral nail edge should be created to allow the lateral nail fold to regrow normally. The technique of wedge excision often fails to remove the spicule. Nail removal without destroying the matrix of the nail that produces lateral nail growth can permit the lateral nail to regrow beneath the lateral nail fold, producing another ingrown nail.

Historically, phenol has been used for matricectomy, but it produces irregular tissue destruction and can result in significant inflammation and discharge after the procedure. Laser works well for matricectomy but is too expensive for most offices. Electrosurgical matricectomy has demonstrated consistent results and is an easily learned technique for most family physicians.

Methods and Materials

PATIENT PREPARATION

The patient is placed in the supine position with knees flexed (foot flat on the table) or leg extended (foot hanging off the end of the table).

EQUIPMENT

Nonsterile Tray for the Procedure

Place the following items on a nonsterile drape covering the Mayo stand:

- Nonsterile gloves
- 10-mL syringe filled with 1 percent lidocaine (Xylocaine), and a 30-gauge needle
- 4 × 4-inch gauze soaked with povidone-iodine solution
- 1 to 2 inches of 4 × 4 gauze
- Fenestrated drape
- Iris scissors
- Bandage scissors
- 2 straight hemostats
- Sterile rubber band (if desired)
- Nail splitter (if desired)
- Monsel's solution and cotton-tipped swabs (if desired)

Electrosurgical Cart

- Electrosurgical unit (such as the Ellman Surgitron)
- 2-mm and 4-mm matricectomy electrodes (flat, Teflon-coated on one side)
- 5-mm ball electrode
- Smoke evacuator with viral particle filtering system

Tray for Postprocedure Dressing

- Unfolded 4 × 4 gauze (for wrapping the toe)
- Antibiotic ointment
- Roll of 1-inch tape
- Surgical sponge slipper to wear over the bandaged toe
- Telfa pad (cut in a 1-inch strip to cover the surgical site)

Procedure Description

1. The patient is placed in the supine position, with the knees flexed (foot flat on the table) or extended (foot hanging off the end of the table). The physician wears nonsterile gloves.

2. The toe is prepped with povidone-iodine solution. A standard digital block is performed with 1 percent lidocaine (without epinephrine), using a 10-mL syringe and a 30-gauge needle. About 2 to 3 mL of lidocaine on each side of the toe is usually sufficient for adequate anesthesia. A wait of five to 10 minutes allows the block to become effective.

3. Some physicians use a sterile rubber band around the base of the toe for a dry operative field. A clean, unused rubber band can be placed in a sterilization pouch and put through an autoclave. Alternatively, pressure to the sides of the toes during the procedure can reduce bleeding. A tourniquet should be used for the shortest possible time only.

4. The toe is rewashed with surgical solution, and a fenestrated drape is placed over the foot, with the involved toe protruding through the drape. A nail elevator or the closed tips of iris scissors are slid under the cuticle to separate the nail plate from the overlying proximal nail fold.

5. The lateral one fourth or one fifth of the nail plate is identified as the site for the partial lateral nail removal. This area is usually where the nail curves down into the toe. The physician uses a nail splitter or bandage scissors, cutting from the distal (free) end of the nail straight back (proximally) beneath the proximal nail fold (*Figures 1 and 2*). A straight, smooth, new lateral edge to the nail plate is created. When the scissors cut through the most proximal edge of the nail beneath the cuticle, a "give" can be felt.

6. The physician grasps the lateral piece of nail with a

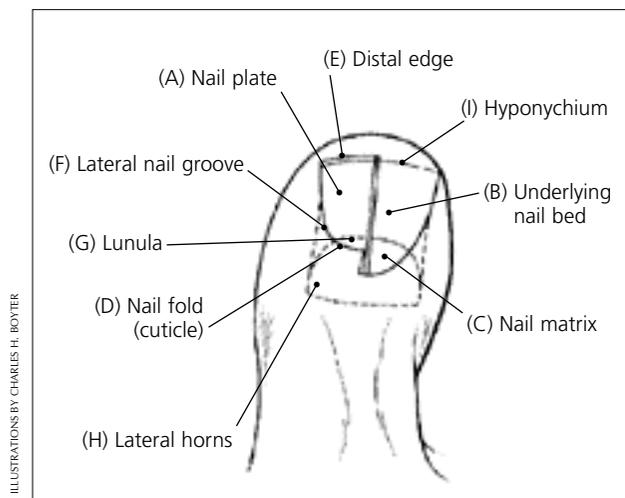


FIGURE 1. Normal nail anatomy. The nail plate (A) receives nutrition from the underlying nail bed (B). The nail plate is created by the nail matrix (C). The nail plate is visible from the proximal nail fold (cuticle) (D) to the distal or free edge (E). The lateral nail fold lies outside of the lateral nail groove (F) and is the area where ingrown nails develop. The nail matrix can be seen at the junction with the nail bed, called the lunula (G). The nail matrix extends to the lateral horns (H). The nail bed extends distally to the hyponychium (I).

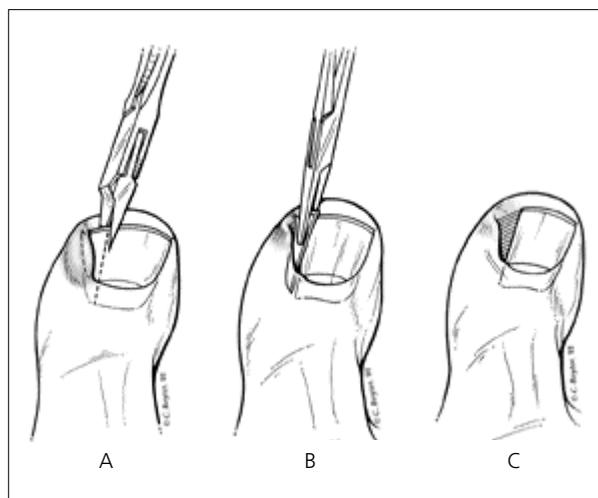


FIGURE 2. Lateral nail avulsion. (A) An ingrown nail is seen with lateral nail fold hypertrophy on the left side of the nail. After administering digital or local anesthesia, scissors, a scalpel blade, or a nail splitter can be used to cut proximally and create a smooth, straight edge. Some physicians prefer to slide a flat nail elevator beneath the nail before making this cut in an effort to reduce trauma to the nail bed. (B) The free lateral nail now is grasped with a hemostat or clamp and removed. (C) The lateral nail bed and matrix are now exposed for ablation.

hemostat, getting as much nail plate as possible into the teeth of the instrument. The lateral nail plate is removed, in one piece if possible, by rotating the fragment outward toward the lateral nail fold, while pulling straight out toward the end of the toe.

7. If the lateral nail plate breaks, the remaining nail is regrasped and pulled out. No fragment of nail plate should remain under the proximal nail fold.

8. Electrocautery ablation is used to destroy the nail-forming matrix beneath the area where the nail plate has been removed. The flat matricectomy electrode is coated on one side to avoid damage to the overlying proximal nail fold. The electrode is placed beneath the nail fold, just above the nail bed, and cautery is applied to a bloodless field using 20 to 40 W of coagulation current (setting, 2 to 4), with sparking, for two to 10 seconds, treating the entire exposed nail bed and matrix twice. A properly treated nail bed has a white appearance after electrocautery.

9. If excessive lateral granulation tissue is noted, the physician may consider removal with electrocautery ablation. A 5-mm ball electrode is moved back and forth over the lateral granulation tissue, coagulating with 40 to 50 W of current (setting, 4 to 5). The destroyed tissue can usually

be wiped away with gauze, and the process repeated until a concavity reveals normal tissue at the base. This site will fill in as healing takes place over the next few weeks.

10. Antibiotic ointment is applied, a bulky gauze dressing is placed, and the patient's foot is put in a disposable surgical slipper. The patient should apply antibiotic ointment daily until healing is complete. The patient should be given the instruction sheet and told to take ibuprofen (Motrin) and acetaminophen (Tylenol) for postoperative pain. Daily cleansing with warm water is encouraged, and strenuous exercise is discouraged for at least one week.

Follow Up

- A pathology evaluation performed on tissue removed during ingrown toenail surgery is rarely needed; only when an abnormal growth or suspected malignancy is encountered would a specimen be sent for pathologic evaluation.

- If increasing pain, swelling, redness, or drainage develop, the toe should be evaluated for infection. Infection is common after ingrown toenail removal. Early intervention with oral antibiotic therapy can be highly effective in preventing infectious complications.

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- Incomplete matricectomy can allow a spicule of new nail to grow laterally, interfering with the newly created lateral nail groove. A second procedure may be required to obliterate the lateral spicule if inadequate matricectomy is performed during the first procedure.

Procedure Pitfalls/Complications

- *Prolonged Application of the Tourniquet Can Lead to Distal Toe Ischemia.* Patients with distal toe ischemia usually present with duskiness, poor healing, occasional ulceration, and even necrosis of the affected digit. Ingrown toenail removal can be performed without a tourniquet, but it is easier with a bloodless surgical field. If a tourniquet is used, it should be removed as soon as possible.

- *Overaggressive Electrocautery to the Nail Matrix Can Damage the Underlying Tissues.* Prolonged or high-current cautery has the potential to damage the fascia or periosteum underlying the nail matrix. If the toe is healing poorly several weeks after the procedure, the physician may consider debridement, antibiotics, and possible radiographic evaluation.

- *The Patient Returns After Two Weeks With a Swollen, Red, Inflamed Toe.* Infection is not unusual after the procedure, and oral antibiotics can be liberally administered. Some physicians routinely prescribe antibiotics for a few days after the procedure. Management of aggressive infection can reduce the chance of patients developing the rare complication of osteomyelitis.

- *The Patient Complains That the Surgery Did Not Get Rid of the Ingrown Nail.* If inadequate matricectomy is performed, a spike of nail can regrow along the new lateral nail fold. This laterally growing piece of nail creates another inflammatory reaction in the lateral toe, necessitating a second procedure. The physician must make sure that the lateral horn matrix cells under the proximal nail fold are adequately ablated the first time.

- *The Nail Bed Is Lacerated When the Nail Is Cut With the Bandage Scissors.* The physician must cut with the

smallest blade of the scissors beneath the nail. The tips of the scissors should be slightly angled upward to avoid lacerating the fragile nail bed beneath the nail plate. Usually, bleeding from superficial lacerations is controlled by electrocautery. Deep lacerations may require suture repair and removal of additional nail.

- *The Patient Is Surprised by the Postoperative Appearance of the Toe.* Patients should be reminded that the procedure will permanently narrow the nail. In addition, the concavity left when the lateral granulation tissue is removed can be a shock, but patients can be reassured that the tissue will gradually fill in.

Physician Training

The technique of nail avulsion and matricectomy is easily learned by physicians with soft tissue surgery and electrosurgery experience. Physicians should have precepted patient procedures. Novice physicians may need 20 procedures before they are comfortable performing the procedure unsupervised. Experienced physicians may be comfortable after performing three to five procedures.

Adapted with permission from Zuber TJ. Office procedures. Baltimore: Lippincott Williams & Wilkins, 1999.

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