

Minimally Invasive Nail Surgery: Techniques to Improve the Patient Experience

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Nail surgical procedures including biopsies, correction of onychocryptosis and other deformities, and excision of tumors are essential for diagnosing and treating nail disorders. Nail surgery often is perceived by dermatologists as a difficult-to-perform, high-risk procedure associated with patient anxiety, pain, and permanent scarring, which may limit implementation. Misconceptions about nail surgical techniques, aftercare, and patient outcomes are prevalent, and a paucity of nail surgery randomized clinical trials hinder formulation of standardized guidelines.¹ In a survey-based study of 95 dermatology residency programs (240 total respondents), 58% of residents said they performed 10 or fewer nail procedures, 10% performed more than 10 procedures, 25% only observed nail procedures, 4% were exposed by lecture only, and 1% had no exposure; 30% said they felt incompetent performing nail biopsies.² In a retrospective study of nail biopsies performed from 2012 to 2017 in the Medicare Provider Utilization and Payment Database, only 0.28% and 1.01% of all general dermatologists and Mohs surgeons, respectively, performed nail biopsies annually.³ A minimally invasive nail surgery technique is essential to alleviating dermatologist and patient apprehension, which may lead to greater adoption and improved outcomes.

Reduce Patient Anxiety During Nail Surgery

The prospect of undergoing nail surgery can be psychologically distressing to patients because the nail unit is

highly sensitive, intraoperative and postoperative pain are common concerns, patient education materials generally are scarce and inaccurate,⁴ and procedures are performed under local anesthesia with the patient fully awake. In a prospective study of 48 patients undergoing nail surgery, the median preoperative Spielberger State-Trait Anxiety Inventory level was 42.00 (IQR, 6.50).⁵ Patient distress may be minimized by providing verbal and written educational materials, discussing expectations, and preoperatively using fast-acting benzodiazepines when necessary.⁶ Utilizing a sleep mask,⁷ stress ball,⁸ music,⁹ and/or virtual reality¹⁰ also may reduce patient anxiety during nail surgery.

Use Proper Anesthetic Techniques

Proper anesthetic technique is crucial to achieve the optimal patient experience during nail surgery. With a wing block, the anesthetic is injected into 3 points: (1) the proximal nail fold, (2) the medial/lateral fold, and (3) the hyponychium. The wing block is the preferred technique by many nail surgeons because the second and third injections are given in skin that is already anesthetized, reducing patient discomfort to a single pinprick¹¹; additionally, there is lower postoperative paresthesia risk with the wing block compared with other digital nerve blocks.¹² Ropivacaine, a fast-acting and long-acting anesthetic, is preferred over lidocaine to minimize immediate postoperative pain. Buffering the anesthetic solution to physiologic pH and slow infiltration can reduce pain

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during infiltration.¹² Distraction¹² provided by ethyl chloride refrigerant spray, an air-cooling device,¹³ or vibration also can reduce pain during anesthesia.

Punch Biopsy and Excision Tips

The punch biopsy is a minimally invasive method for diagnosing various neoplastic and inflammatory nail unit conditions, except for pigmented lesions.¹² For polydactylous nail conditions requiring biopsy, a digit on the nondominant hand should be selected if possible. The punch is applied directly to the nail plate and twisted with downward pressure until the bone is reached, with the instrument withdrawn slowly to prevent surrounding nail plate detachment. Hemostasis is easily achieved with direct pressure and/or use of epinephrine or ropivacaine during anesthesia, and a digital tourniquet generally is not required. Applying microporous polysaccharide hemospheres powder¹⁴ or kaolin-impregnated gauze¹⁵ with direct pressure is helpful in managing continued bleeding following nail surgery. Punching through the proximal nail matrix should be avoided to prevent permanent onychodystrophy.

A tangential matrix shave biopsy requires a more practiced technique and is preferred for sampling longitudinal melanonychia. A partial proximal nail plate avulsion adequately exposes the origin of pigment and avoids complete avulsion, which may cause more onychodystrophy.¹⁶ For broad erythronychia, a total nail avulsion may be necessary. For narrow, well-defined erythronychia, a less-invasive approach such as trap-door avulsion, longitudinal nail strip, or lateral nail plate curl, depending on the etiology, often is sufficient. Tissue excision should be tailored to the specific etiology, with localized excision sufficient for glomus tumors; onychopapillomas require tangential excision of the distal matrix, entire nail bed, and hyperkeratotic papule at the hyponychium. Pushing the cuticle with an elevator/spatula instead of making 2 tangential incisions on the proximal nail fold has been suggested to decrease postoperative paronychia risk.¹² A Teflon-coated blade is used to achieve a smooth cut with minimal drag, enabling collection of specimens less than 1 mm thick, which provides sufficient nail matrix epithelium and dermis for histologic examination.¹⁶ After obtaining the specimen, the avulsed nail plate may be sutured back to the nail bed using a rapidly absorbable suture such as polyglactin 910, serving as a temporary biological dressing and splint for the nail unit during healing.¹² In a retrospective study of 30 patients with longitudinal melanonychia undergoing tangential matrix excision, 27% (8/30) developed postoperative onychodystrophy.¹⁷ Although this technique carries relatively lower risk of permanent onychodystrophy compared to other methods, it still is important to acknowledge during the preoperative consent process.¹²

The lateral longitudinal excision is a valuable technique for diagnosing nail unit inflammatory conditions. Classically, a longitudinal sample including the proximal

nail fold, complete matrix, lateral plate, lateral nail fold, hyponychium, and distal tip skin is obtained, with a 10% narrowing of the nail plate expected. If the lateral horn of the nail matrix is missed, permanent lateral malalignment and spicule formation are potential risks. To minimize narrowing of the nail plate and postoperative paronychia, a longitudinal nail strip—where the proximal nail fold and matrix are left intact—is an alternative technique.¹⁸

Pain Management Approaches

Appropriate postoperative pain management is crucial for optimizing patient outcomes. In a prospective study of 20 patients undergoing nail biopsy, the mean pain score 6 to 12 hours postprocedure was 5.7 on a scale of 0 to 10. Patients with presurgery pain vs those without experienced significantly higher pain levels both during anesthesia and after surgery (both $P < .05$).¹⁹ Therefore, a personalized approach to pain management based on presence of presurgical pain is warranted. In a randomized clinical trial of 16 patients anesthetized with lidocaine 2% and intraoperative infiltration with a combination of ropivacaine 0.5 mL and triamcinolone (10 mg/mL [0.5 mL]) vs lidocaine 2% alone, the intraoperative mixture reduced postoperative pain (mean pain score, 2 of 10 at 48 hours postprocedure vs 7.88 of 10 in the control group [$P < .001$]).²⁰

A Cochrane review of 4 unpublished dental and orthopedic surgery studies showed that gabapentin is superior to placebo in the treatment of acute postoperative pain. Therefore, a single dose of gabapentin (250 mg) may be considered in patients at risk for high postoperative pain.²¹ In a randomized double-blind trial of 210 Mohs micrographic surgery patients, those receiving acetaminophen and ibuprofen reported lower pain scores at 2, 4, 8, and 12 hours postprocedure compared with patients taking acetaminophen and codeine or acetaminophen alone.²² However, the role of opioids in pain management following nail surgery has not been adequately studied.

Wound Care

An efficient dressing protects the surgical wound, facilitates healing, and provides comfort. In our experience, an initial layer of petrolatum-impregnated gauze followed by a pressure-padded bandage consisting of folded dry gauze secured in place with longitudinally applied tape to avoid a tourniquet effect is effective for nail surgical wounds. As the last step, self-adherent elastic wrap is applied around the digit and extended proximally to prevent a tourniquet effect.²³

Final Thoughts

Due to the intricate anatomy of the nail unit, nail surgeries are inherently more invasive than most dermatologic surgical procedures. It is crucial to adopt a minimally invasive approach to reduce tissue damage and potential complications in both the short-term and long-term. Adopting this approach may substantially

improve patient outcomes and enhance diagnostic and treatment efficacy.

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