The occasional nail bed laceration

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INTRODUCTION

Injuries to fingertips are not uncommon with manual work, especially in a rural setting where there is more home-based use of power tools. Fingertip injuries are usually accompanied by lacerations to the distal nail bed.[1] Simple lacerations of the nail bed [Figure 1] can be managed by suturing the damaged structures, and this procedure can be done in an emergency department setting.[2] Avulsion or severe crush injuries may require grafting for optimum outcome.[1] Tuft fractures are commonly associated with nail bed lacerations [Figure 1] which can often be managed with the repair of the nail bed and surrounding structures.[1] In addition to closing lacerations in the repair of a nail bed injury, the eponychium should be stented to prevent the adhesion to the germinal matrix.[3] In this article, we describe a procedure for managing simple lacerations to the nail bed.

PROCEDURE

Initial assessment

Tetanus vaccination status should be determined for patients with any lacerations and booster shots should be given if required. Obtain a history for the mechanism of injury and assess the extent of injury. If there is significant germinal matrix damage, the nail may not grow. Perform a physical examination to determine the presence of tendon injury and obtain X-ray imaging to assess injury to bones.

Material

- Local anaesthesia (1% lidocaine, bupivacaine or ropivacaine, bicarbonate solution)
- Tourniquet (Penrose drain)
- 5-0 Monocryl sutures
- Suture kit: Haemostat for nail removal, toothed forceps, needle driver and scissors
- Aluminium foam finger splint and non-adhesive dressing
- Chlorhexidine preparation.

Digital nerve block

Proper digital nerves (PDNs) run on the volar side from the metacarpophalangeal (MCP) joint to the fingertip along either side of a finger and trifurcate at the level of the distal interphalangeal joint to give off branches that supply the nail bed, pulp and distal fingertip.[1] Blocking PDN at the web space level will provide sufficient anaesthesia. A mix of short-acting anaesthetic, long-acting anaesthetic and bicarbonate solution

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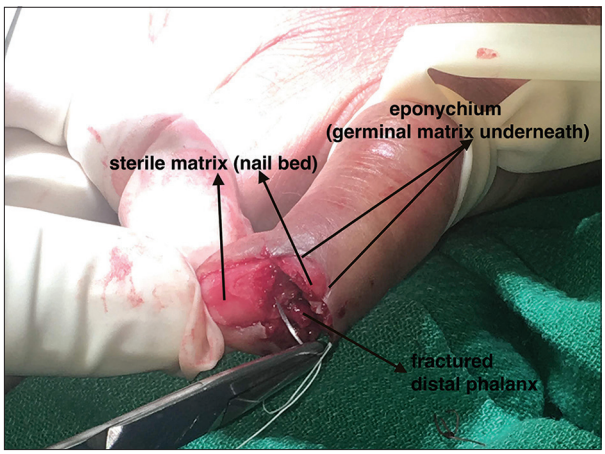


Figure 1: Nail bed injury with tuft fracture of the left fifth digit resulted from working with garden scissors. Finger nail is removed and important structures are labelled.

at 7:2:1 ratio, results in a neutral solution that provides rapid and prolonged pain relief.[4] For example, 7 ml of 1% lidocaine, 2 ml of ropivacaine (or bupivacaine) and 1 ml of sodium bicarbonate solution can be mixed just before the use. We recommend a 'three-point injection' technique for local anaesthetic administration.

1. On the dorsum of the proximal phalanx, just distal to the MCP, infiltrate in the center [Figure 2a] where skin laxity is the greatest
2. Once the dorsum is infiltrated, withdraw the needle slightly and through the same puncture, advance needle to the ulnar/radial side to infiltrate further, ensuring to stop just before penetrating the volar surface
3. Next, withdraw the needle completely and inject radial [Figure 2b] and ulnar side of the finger. It is important to infiltrate the anterior aspect of the affected finger because PDN has a volar course. We believe this method is less painful in comparison to injecting the volar side directly; it also provides additional anaesthesia through acting on the dorsal nerves
4. Prepare the area with antiseptic solution followed by sterile draping
5. Place tourniquet on the base of the finger after sufficient anaesthesia and remove the nail with haemostat.
6. Grasp nail with haemostat and use gentle side-to-side motion to remove the nail completely. The removed nail can be used for stenting if intact
7. For the purpose of stenting, the nail should be cleaned thoroughly, and any attached soft tissue should be removed; it should also be immersed in antiseptic solution before use.

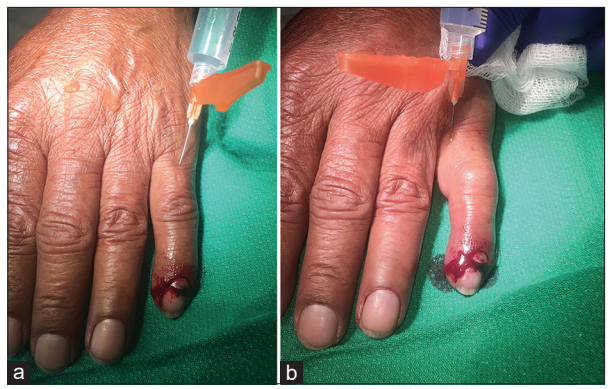


Figure 2: Dorsal injection of local anaesthetic in the (a) middle and (b) radial side of the injured finger.

Repair of the nail bed and surrounding structures

1. Irrigate wound with saline after nail removal
2. Repair the nail bed with simple interrupted sutures using 5-0 Monocryl (other small dissolving sutures if 5-0 Monocryl unavailable). The monofilament dissolvable suture is preferred because it has lower bacterial adherence and glides easily
3. Start suturing at the outermost aspect of sterile matrix for better approximation
4. Gently grasp the fingertip with toothed forceps to bring wound edges together and take adequate bite from the sterile matrix
5. Add subsequent sutures to close the sterile matrix. Sutures should provide just enough tension to allow wound edge approximation; pulling sutures too tight will compromise blood flow and possibly result in tissue necrosis. Good nail bed approximation is key for healing
6. Continue with simple interrupted sutures to repair damage to surrounding skin with 5-0 dissolvable suture.

Stenting

Stenting of the germinal matrix can be achieved using the patient's own nail when available. Alternatively, a suture package can be modified to serve the same purpose.

1. Cut plastic suturing package to approximate the size of the removed fingernail and insert underneath the eponychium; a small piece is

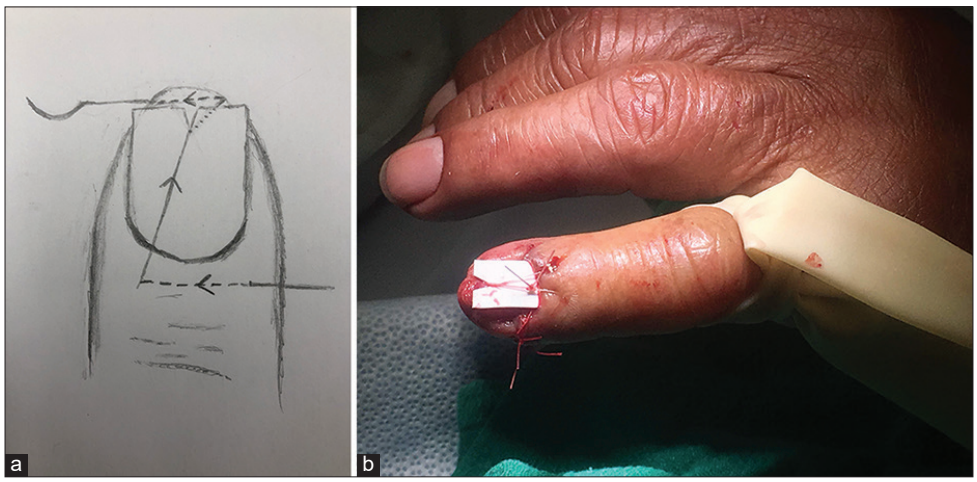


Figure 3: Stenting of the eponychium involves the following steps: (a) Insert customized stenting material underneath eponychium and hold stenting material in place by passing needle through proximal nail fold and taking adequate bite from the pulp of the finger; arrow indicates direction of suture, dashed lines indicate suture beneath skin, dotted lines indicate suture between stenting material and finger, solid lines indicate suture on top of structures. (b) Stenting of the eponychium with figure-of-eight stitch.

cut off the stenting material distally to hold the suture in place

2. Stenting material is held in place with a figure of 8 suture.
   - The first suture passed through the proximal nail fold [Figure 3a]
   - The second suture passed through the pulp of the finger [Figure 3a]
   - Pass suture through indentation and tie up loose ends with the surgeon's knot [Figure 3b].

Recovery[1]

1. The fingertip should be dressed loosely with non-adhesive dressing, gauze, aluminium splint and tape or bandage. Stax splint is another option for splinting given that it is large enough to allow loose dressing
2. The injured finger should be protected with a splint for 4 weeks or more depending on whether there is an underlying fracture
3. Patients should avoid strenuous activities and keep injured finger dry and clean
4. Oral antibiotics should be given to prevent infection. Patients should be on cefalexin (500 mg every 6 h) or clindamycin (if allergic to penicillin, 450 mg every eight hours) for 7 days. Suture material will dissolve and the stent will automatically come out.
5. It takes 100 days for a new nail to grow and typically a year for the nail to start getting normal
6. Referral to physiotherapy and occupational therapy is paramount for optimal recovery
7. Note additional splinting is required for associated tendon injury.

CONCLUSION

This article presents the management of simple nail bed lacerations which can be carried out in a rural setting. Important things to note for a nail bed laceration are to use appropriate anaesthesia with the 'three-point injection' technique, using fine dissolvable sutures for nail bed repair, stenting of eponychium to allow nail growth and therapy and splinting for best outcomes.

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