Management of Nailbed Laceration Repair in the Emergency Department: Attending-specific Preference and Tips for Residents

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Introduction

The fingertip is a vital element of the distal finger anatomy, serving several crucial functions including protecting the fingertip, regulating peripheral circulation, and providing sensory and tactile feedback. It is composed of complex anatomy that consists of the nail bed, nail plate, perionychyium (the tissue surrounding the nail). The nail matrix can be compromised due to multiple conditions, including lacerations and

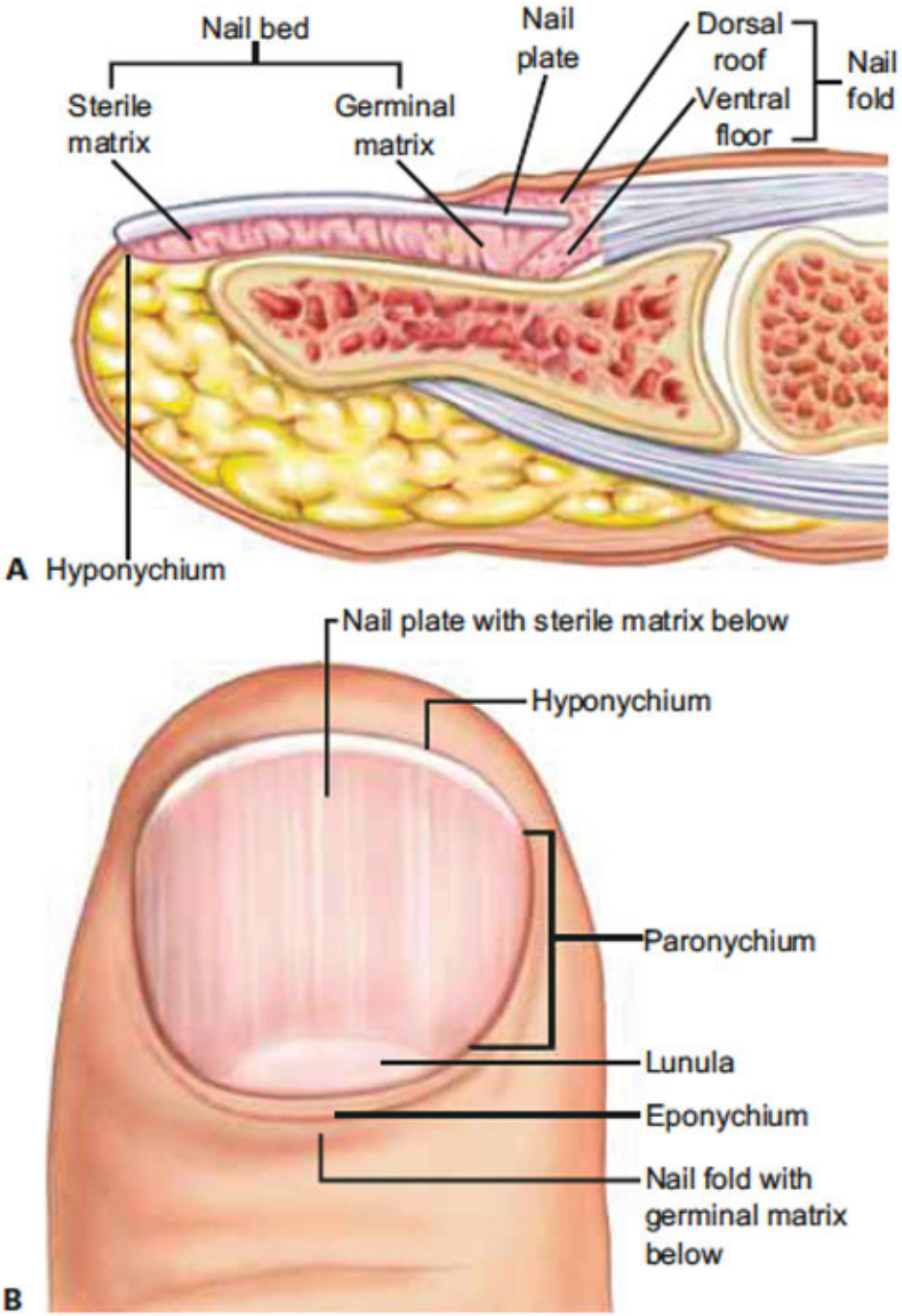

Figure 1. Anatomy of the Perionychium and its associated structures (obtained from Wiesel 2016).

trauma, crush injuries, tumors, and infections. Injuries to the nailbed and surrounding tissue can lead to functional and cosmetic complications, possibly necessitating intervention in the acute period to ensure function and a normal-appearing nail. Several methods exist for management of fingertip trauma. Here we describe the anatomy of the fingertip, procedures for repair of fingertip injuries, and the results of a survey of orthopaedic- and plastic surgery-trained faculty at the University of Pennsylvania regarding their preferred approach to treating such injuries.

Anatomy and Treatment Review

Anatomy

The distal fingertip is comprised of the nail bed, the nail plate, and the surrounding perionychium (Figure 1). The nail bed, which is comprised of the sterile matrix (distally) and the germinal matrix (proximally), is covered by the overlying nail plate. Nail growth originates from the germinal matrix at the proximal end of the nail bed. The proximal end of the nail plate is covered by the nail fold (eponychial fold) and the

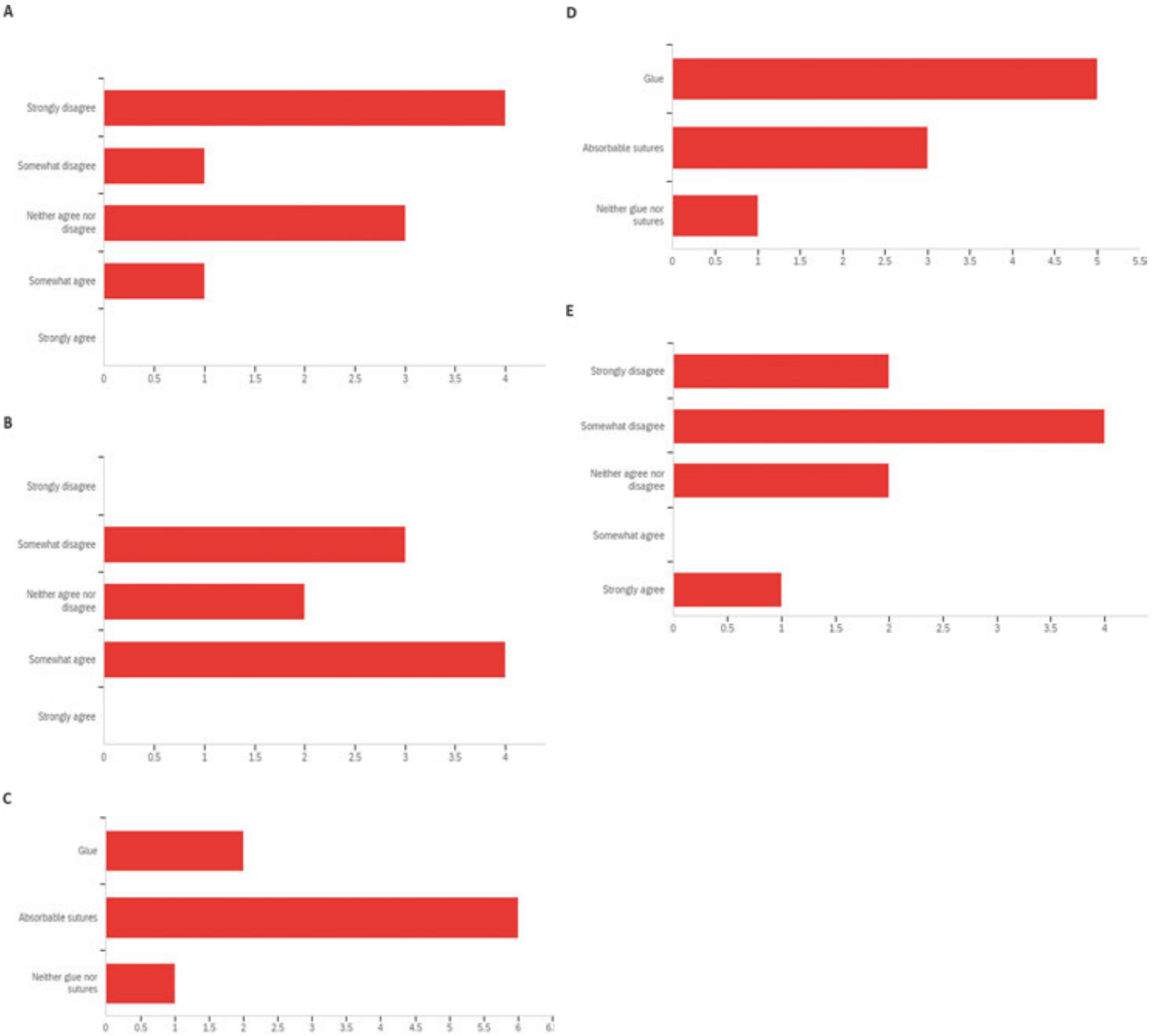

Figure 2. Survey questionnaire and results regarding nailbed injuries. **(A)** Subungual hematomas without evidence of fracture on X-ray require nail removal as part of the treatment. **(B)** Subungual hematomas with evidence of fracture on x-Ray require nail removal as part of the treatment. **(C)** Once the nail plate is removed. A linear laceration without markedly exposed bone is present in the sterile matrix only. This laceration should be treated with glue, absorbable sutures, or neither. **(D)** If a stellate laceration was encountered without markedly exposed bone, this should be treated with glue, absorbable sutures, or neither. **(E)** After removal of the nail plate and laceration repair, stenting open the proximal eponychial fold is necessary.

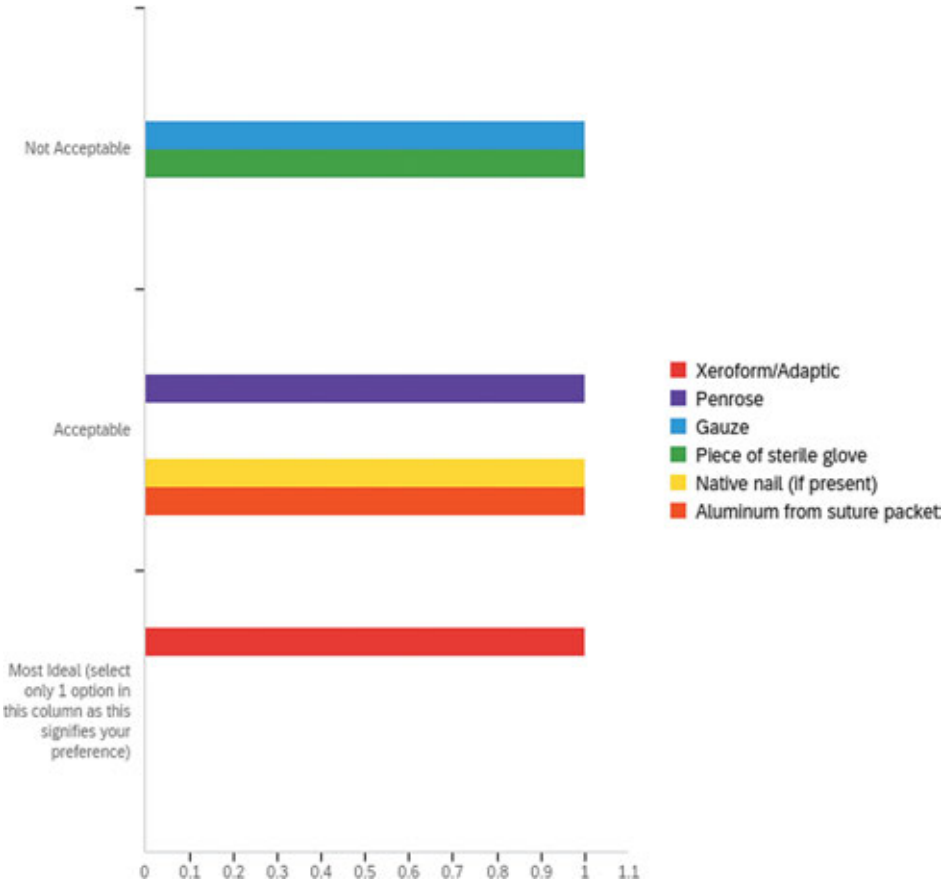

Figure 3. Option for Stenting the proximal eponychial fold in the setting of a laceration (linear or stellate) isolated to the sterile matrix when the nail plate is no longer present.

bordering tissues around the nail are the paronychial folds. The eponychium is the thin layer of tissue that extends onto the nail plate from the nail fold[1].

Procedure

In the setting of fingertip injuries such as subungual hematoma when intervention is indicated and simple trephination is not ideal, a digital block is performed—often with 1% lidocaine without epinephrine. The affected digit is then exsanguinated with a digital tourniquet, then prepared and draped. The nail is then removed with gentle blunt dissection, often with a Freer elevator, deep to the plate and then superficial to the plate proximal to the eponychial fold. Attachments to the paronychial folds are dissected and the nail plate is removed. Traditionally, repair of the sterile matrix consists of approximation of the lacerated with absorbable sutures (e.g., 5-0 chromic gut). Once the repair is performed, the nail fold may be stented open. This can be accomplished with the native nail plate if in good condition and not contaminated, a thin aluminum sheet such as from a suture package, gauze impregnated with petroleum jelly, or a piece of sterile glove. However, O'Shaughnessy, et al.2 reported no difference in outcomes whether the nail plate was replaced or left off after repair. Furthermore, Strauss, et al.3 found no difference in outcomes when the lacerations are repaired with sutures or Dermabond. Despite the current literature, there remains a difference in management based on surgeon preference. This variability creates confusion for consult residents and possibly affects patient outcomes.

Results

Attendings Preference Survey

Nine board-eligible or board-certified hand surgeons from the Orthopaedic or Plastic and Reconstructive surgery departments at the University of Pennsylvania were surveyed regarding their preferred treatment practice of acute fingertip injuries (Figure 2). In the setting of subungual hematoma, with no evidence of fracture on imaging, 44% strongly disagreed with removal of the nail plate as part of the treatment (11% somewhat agreed), while those numbers changed to 44% somewhat agreeing to removing the nail plate in the setting of acute fracture on present on X-ray. Regarding the laceration repair, a minority (22%) favored surgical glue, while the majority preferred primary treatment with absorbable sutures (66.7%) when the laceration was linear. When the laceration was stellate, 55.6% of surgeons preferred the use of glue. Regarding stenting the eponychial fold after laceration repair in the sterile matrix, the majority believed it was not necessary to replace the nail plate (66%), while only one surgeon felt it was necessary to stent it open. Given the option to keep the eponychial fold open, that surgeon preferred aluminum from the suture packet to be used for a stent but noted that the native nail, a penrose, or xeroform/adaptic were acceptable. Dry gauze or a piece of sterile glove were not acceptable options.

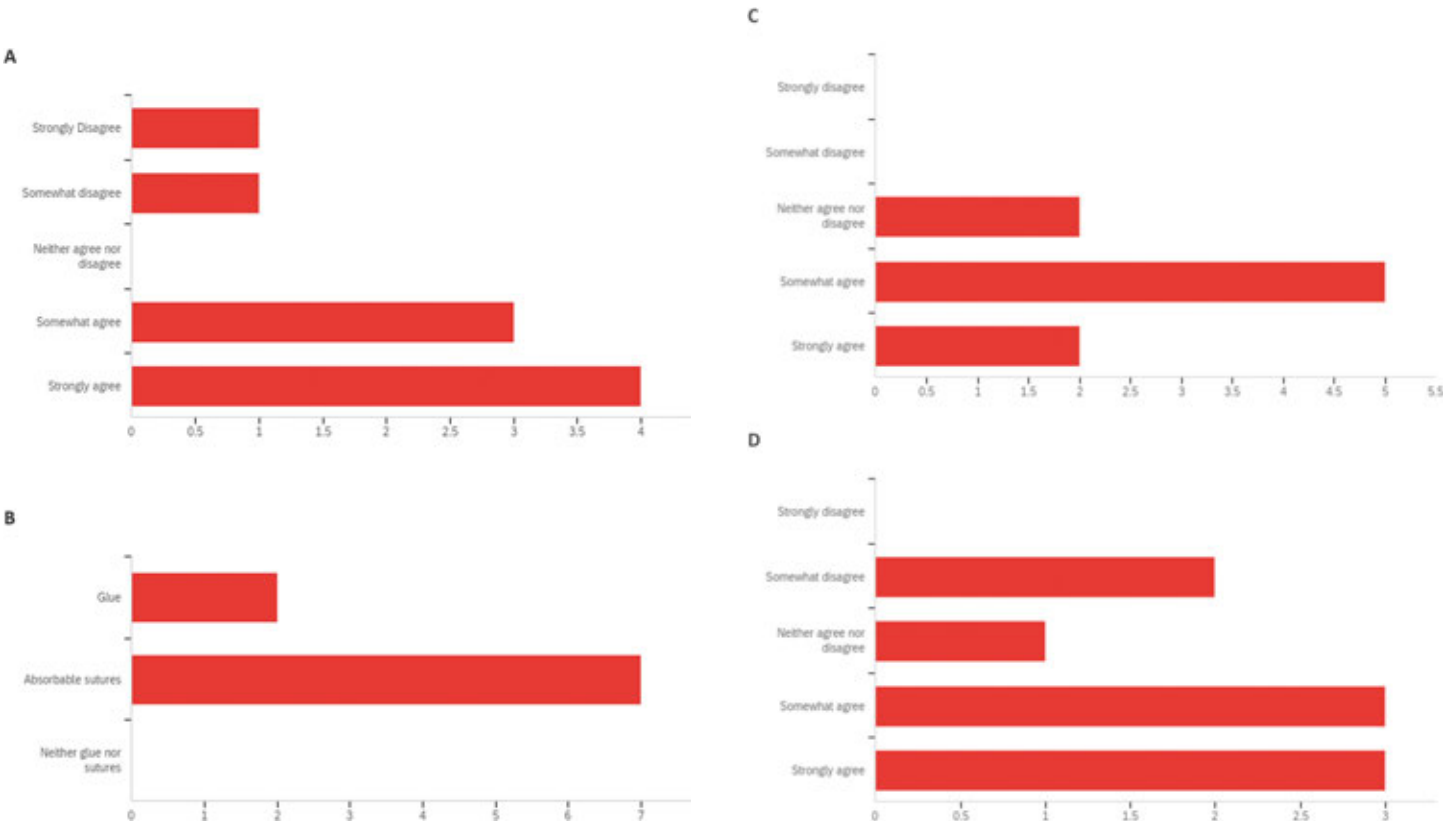

Figure 4. Survey questionnaire and results regarding injuries to the germinal matrix. (A) Lacerations through the proximal eponychial fold and into the region of the germinal matrix require nail plate removal. (B) After removing the nail from underneath the proximal eponychial fold or the nail has already been removed by the trauma. A jagged laceration without exposed bone with slight gapping of the tissue is present that extends through the proximal eponychial fold. This laceration should be treated with. (C) Visual evaluation of the germinal matrix is mandatory in the emergency department to assess injury during initial evaluation of a laceration that extends through the proximal eponychial fold. (D) After repair or non-intervention of a laceration that extends through the proximal eponychial fold when the nail plate is no longer present, stenting open the proximal eponychial fold is necessary.

When the germinal matrix was involved in the laceration, 77.8% of surgeons preferred removal of the nail plate, 77.8% of surgeons preferred sutures for repair of the germinal matrix laceration, and 66.7% of surgeons preferred stenting of the proximal eponychial fold. The native nail was most favored as the object with which the fold was stented (3 of 5), but all other options were acceptable to except for dry gauze (Figure 3). In cases where lacerations involved the proximal eponychial fold and extended into the region of the germinal matrix the majority (44% strongly agreed, 33% somewhat agreed) to the removal of the nail plate. In such cases where there's a lacercation through the proximal eponychial fold, visual evaluation of the germinal matrix should be performed to assess the injury (55% somewhat agree, and 22% strongly agree). Majority also agreed to stent the nailbed open in these injuries (Figure 4).

Conclusion for Residents

There was no clear consensus among the faculty as to the optimal approach to nail bed injuries encountered in the Emergency Department. However, there are valuable learning tips for residents from this survey. Not all injuries absolutely require nail plate removal and clinical judgment should be utilized in each situation. If there is a laceration present, most surgeons favored the use of an absorbable suture. Finally, stenting the eponychial fold open is not mandatory in some situations.

Each injury encountered in the ED is unique and thus should have a tailored treatment approach, which is guided by a discussion between the resident and attending on call.

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