

Pediatric Ectopic Nail Formation following Fingertip Trauma: A Case Report and Literature Review

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Summary: Post-traumatic ectopic nail is an uncommon entity that is occasionally observed after trauma to the fingertip and nail, resulting in aesthetic and functional morbidity. We report a case of post-traumatic ectopic nail in a 3-year-old girl following trauma to her index finger and subsequent surgical intervention to remove an inclusion cyst. The unusual clinical sequence is presented to highlight the etiology and treatment of this rare lesion. (*Plast Reconstr Surg Glob Open* 2020;8:e3291; doi: 10.1097/GOX.0000000000003291; Published online 18 December 2020.)

Ectopic nail formation may be classified broadly as either congenital or post-traumatic in nature. It is rarely reported in the literature, with the post-traumatic variety much less frequently reported than its congenital counterpart.^{1,2} Further, post-traumatic ectopic nail formation (PTEN) is more frequently reported in adults, with few pediatric cases in the literature.³⁻⁹ We report a case of a 3-year-old girl who sustained fingertip trauma and subsequently developed an inclusion cyst over the dorsal distal phalanx, which was surgically excised and resulted in PTEN formation.

CASE REPORT

A 3-year-old healthy girl presented to the plastic surgery clinic for evaluation of an unusual nail growth from her left index finger. Her mother reported that her fingertip sustained a combination crush-laceration after it was inadvertently caught in a pair of scissors, resulting in a circumferential laceration proximal to the eponychium with an underlying transverse minimally-displaced fracture of the distal phalanx base (Fig. 1). The superficial laceration was repaired in our emergency department and healed uneventfully. One year later, the patient returned to the ED with a swollen 6-mm painful mass proximal to the nail fold on the dorsal-ulnar aspect of the injured digit. The mass was incised with an 18-gauge needle, with viscous white discharge. The patient was referred to the hand clinic, diagnosed with an inclusion cyst, and the mass was excised a week later under general anesthesia. Upon exploration, white chalky debris was noted. The

entire cyst, including the cyst wall, was removed and the cavity curetted. Six months postoperatively the patient presented to our clinic with an ectopic nail at the site of excision (Fig. 2). The patient's mother reported that the nail fragment had grown slowly and caused intermittent discomfort. Despite this, the family has refused surgical intervention to date.

DISCUSSION

Ectopic nail formation, defined as persistent growth of nail tissue at any site other than the anatomic nail unit, was first reported by Ohya nearly a century ago, and is classified as either congenital or post-traumatic in nature.^{1,2} Although pathogenesis is undefined, the 3 most commonly cited etiological candidates are the presence of ectopic germ cells, unrecognized underlying subclinical polydactyly, and traumatic inoculation of nail-producing cells into a non-anatomic location.^{1,2} Congenital ectopic nails occur most commonly on the palmar aspect of the small finger, but may occur on other fingers, toes, and even have been reported to occur on the heel and chest.^{2,10}

PTEN is hypothesized to result from transplantation of nail-producing cells to a site remote from the anatomic nail unit and manifests most commonly on the dorsum of the finger.² This theory is supported by Kligman's studies, wherein he grafted areas of nail matrix onto the forearms of test subjects, resulting in formation and growth of ectopic nails.⁹

Although ectopic nails may resemble the native nail unit, they characteristically present as small "spikes" of nail.² Histologic evaluation of ectopic nail fragments has shown that the cellular architecture parallels that of native nails, although the biochemical makeup may differ slightly.² Ectopic nails may result in bony abnormalities if the ectopic matrix contacts the underlying bone and interferes with its intramembranous ossification process.² The majority of PTEN arise 2-3 months after the digit injury.⁸ Uncharacteristically, our patient presented 1-year

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Fig. 1. AP projection of an x-ray demonstrating comminuted transverse fracture of the base of the distal phalanx of the left index finger.

after injury with an inflamed fluctuant mass just proximal to the nail fold, which was diagnosed as an inclusion cyst and treated accordingly. Although no frank nail fragments were identified at cyst excision, it is possible that the contents may have been early nail formation products, given the subsequent development of an ectopic nail shortly thereafter. Indeed, there is one similar report in the literature in which a child developed an inflamed mass several weeks after a fingertip trauma, which subsequently developed into an ectopic nail.⁷ It is also possible that during excision of the cyst, the germinal matrix was injured,

resulting in seeding of germinal matrix cells and subsequent ectopic nail formation.

Management of ectopic nails in the hand ranges from observation to excision and is guided by the appearance of the nail and symptom severity. The most common findings are irritation, pruritis, and frequent snagging on clothing and other items. In asymptomatic cases, conservative management with observation and intermittent nail clipping is reasonable.^{4,8} For patients bothered by the aesthetics or discomfort, the gold standard is surgical excision. Excision may be performed in adults using digital block and finger tourniquet. In pediatric patients, excision under general anesthesia is often necessary. The nail fragment is excised by raising a proximally-based rectangular flap with parallel longitudinal incisions extending proximally from the corners of the ectopic nail fold, and then excising the ectopic nail plate and any germinal matrix beneath it. Excision of all underlying ectopic germinal matrix is critical. The wound is then closed by advancing the previously-raised rectangular flap, or with a local flap if additional tissue coverage is needed. It is important to respect the local anatomy, taking care not to violate native nail fold or matrix, underlying tendons, and joint spaces. In all case reports, patients who underwent excision were symptom-free and recurrence-free at the time of follow-up.^{3-5,7} Although risk factors for and prevention of PTEN formation have not been specifically studied, it seems logical that a thorough examination of the wound at the time of injury and recognition of a germinal matrix injury, followed by thorough irrigation and anatomical repair, may reduce its incidence, as the majority of cases in the literature arise after unrecognized (and therefore unrepaired) germinal matrix injury.

CONCLUSION

Both congenital and post-traumatic ectopic nail formation in the hand is rare, but an understanding of the presentation and management is important for hand surgeons and general plastic surgeons alike.

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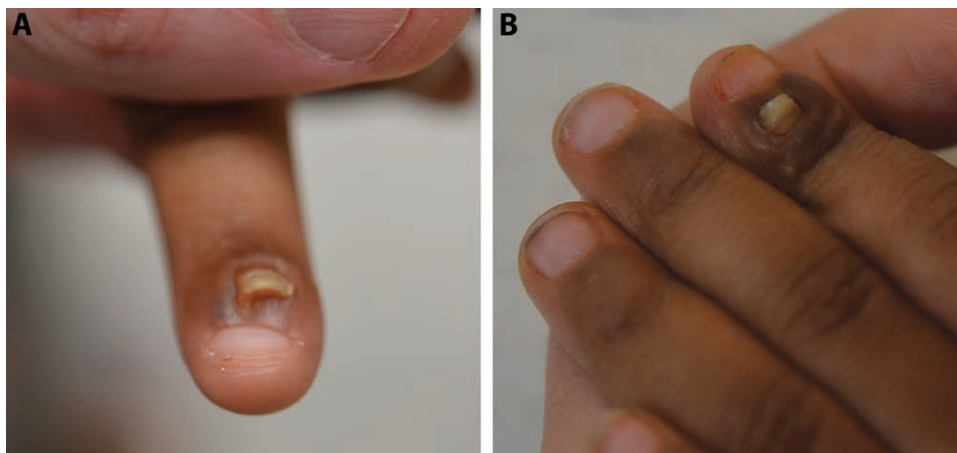


Fig. 2. Post-traumatic ectopic nail formed on the dorsal ulnar aspect of the left index finger, proximal to the eponychial fold. Dorsal view of the index fingertip (A), compared with unaffected fingers (B).

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