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NAIL BED INJURIES AND SURGICAL REPAIR IN CHILDREN

Orthopaedics

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ABSTRACT

Introduction: Nail bed injury is one of the most common hand injuries in children. Even though controversy exists regarding the management of minor nail the injuries it is university accepted that severe nail bed injuries should be repaired to minimize long time deformities The aim of the present study was to evaluate the functional and cosmetic results of nailbed repair**.**
Methods:. 147 had distal finger injury and 126 had documented nail bed injury. we tried to review the results of the 126 children.94 nail bed injuries in 86 children were reviewed and 40 children were lost for follow up. Follow up was from one yr to four years average follow up of 2.5 years.
Results: Results were determined for 94 nails after follow up examination by the authors, in all cases comparing the healed nail with the same nail on the opposite hand. New Nails were judged for shape, adherence, surface characteristics, splitting, and the appearance of the eponychial fold. Nonidentically shaped nails were narrower or shorter or had abnormal longitudinal or transverse curvature.
Conclusion: Surgical repair of the nail bed in children gives a reliable good functional and cosmetic outcome. Complications of sever nail bed injuries can be decreased by care full fold and nail bed repair.

KEYWORDS

nail bed injury, nail bed repair, surgical repair

INTRODUCTION

Nail bed injuries are common, with fingertip injuries being the most often seen type of hand injuries. The fingertip is frequently injured because it is the point of interaction between the body and one's surroundings in the majority of activities performed on a daily basis, and it is the most distal portion of the upper extremities.

In addition to long-term cosmetic consequences, injuries to the nail can affect daily living. The nail provides protection for the fingertip, offers the ability to pick up small objects, and plays a role in tactile sensation. It also serves as a counter force when the finger pad touches an object; two-point discrimination distance widens substantially with removal of a nail.

To fully appreciate the consequences and treatment of nail bed injuries, reviewing the anatomy of the nail bed and the surrounding tissues is useful.

Longitudinal nail growth takes between 70 and 160 days to cover the entire length of the nail. After an injury, nail growth is stunted or absent for up to 21 days. The nail then grows rapidly for approximately the next 50 days and then slows again before a normal and sustained growth rate resumes. These relative accelerations and slows down in nail growth create the characteristic lump that is often observed on most nails that regrow after trauma.

As a result of scar tissue being unable to produce nail material, damage to specific components of the perionychium will lead to characteristic defects during regrowth of the posttraumatic nail .A scar of the dorsal roof of the nail fold creates a dull streak on the nail surface, while a scar of the germinal matrix may cause a split or absent nail, and a scar in the sterile matrix results in a split or nonadherent nail beyond the scar.

The nail bed is supplied by two volar arterial arches that are anastomoses between digital arteries of the finger or toe, just above the periosteum of the distal phalanx. Venous drainage coalesces in the proximal nail bed and proximal to the nail fold and drains over the dorsum of the finger .Abundant lymphatic vessels are present in the nail bed. The perionychium is innervated by the dorsal branches of the paired digital nerves, one to the nail fold, one to the fingertip, and one to the pulp.

AIMS AND OBJECTIVES

1) Evaluate the various mechanisms of causing nail bed injuries in children.
2) Distribution of the injuries various age groups in children.
3) Various complications following nail bed injuries.
4) Final outcome following treatment of the nail bed injuries.

REVIEW OF LITERATURE

Fingertip injuries are perhaps the most frequently encountered by a hand surgeon on an emergency basis[1]. Damage to nail bed is ported to occur in 15 to 24% of finger tip injuries[2,3,4]

Adequate primary treatment is necessary to minimize subsequent nail deformities[5]. The best way to achieve smooth, relatively scar free nail bed is to accurately approximate with fine sutures (6-0, 7-0 and loupes) and to replace the cleansed nail plate back over the nail bed into the nail fold[6].replacement of nail plate is as important as the nail bed repair itself as it prevents synchae of nail fold[6], acts as perfect mould for the nail bed and splint the frequently fractured distal phalanx[6].

MATERIALS AND METHODS

Of the total 284 single finger injuries in (children complete amputations and closed fractures excluded) were treated in last four years (Jan2012-Dec.2015).

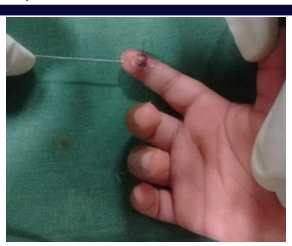
147 had distal finger injury and 126 had documented nail bed injury. we tried to review the results of the 126 children.94 nail bed injuries in 86 children were reviewed and 40 children were lost for follow up. Follow up was from one yr to four years average follow up of 2.5 years.

Injuries were separated into those involving the nail alone and those with more extensive trauma to the soft tissue of the fingertip or with distal phalanx fracture. The area of nail bed involved was defined anatomically as distal, middle, or proximal nail bed and dorsal or palmar nail fold.

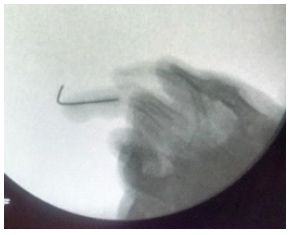
Nail bed repairs were performed under loupe magnification and tourniquet control. Careful minimal debridement of crushed tissue was done when possible without causing tension on the

Nailbed injury with avulsion of nail plate

Nail bed injury intra operative –nail plate fixation



Nail bed injury intra operative pulp repair



Intraoperative image k-wire fixation

RESULTS

Results were determined for 94 nails after follow up examination by the authors, in all cases comparing the healed nail with the same nail on the opposite hand. New Nails were judged for shape, adherence, surface characteristics, splitting, and the appearance of the eponychial fold. Nonidentically shaped nails were narrower or shorter or had abnormal longitudinal or transverse curvature. Nail adherence was recorded as complete or incomplete (adherence greater than two thirds, between one and two thirds, or less than one third). Eponychial notching or synechia was recorded. The nail surface was categorized as identical, slightly rough, or very rough, and as having longitudinal ribs or transverse grooves. Slightly rough was defined as having palpable or visual roughness that was asymptomatic. Very rough nails were similarly deformed but were symptomatic (e.g. nails caught on clothing, required filing down, etc.).All split nails, nails with less than two-thirds adherence, and very rough nails were considered major deformities. Other deformities were considered minor.

The sum of the minor and major variations for each fingertip was used to determine a grade of excellent, very good, good, fair, or poor for each result. An excellent result was defined as a repaired nail identical to the opposite nail. A very good result exhibited one minor variation from identical. A good result had two minor variations, while a fair result had three minor or one major variation. A Poor result exhibited more than three minor or one major variation from identical. Statistical relationships with chi-square analysis were then generated between the injury categories and result categories and grade.

Grading of the final outcome (Zook e.g.et al.1984)

-Excellent : Nail identical to opposite nail

-Very good : Only one minor deformity

-Good : Two minor variations

-Fair : Three minor or one major deformity

-Poor : More than three minor or one major deformity

Age Group	No of Children		
	Male	Female	Total
0-4 Yrs	41	34	75
4-8 Yrs	17	07	24
8-12 Yrs	15	12	27
Total	73	53	126

Mechanism of injury

Door crush Injury		90
Wooden Door	54	
Iron Gate	24	
Bed Box	9	
Car Door	3	
Crush between objects (Bricks, Stones, Shoes)		19
Sharp Objects (Glass Knife etc.)		11
Others		6

Frequency of individual finger

	Right	left	Total
Thumb	19	04	23
Index	10	17	27
Middle	27	11	38
Ring	11	12	23
Little	17	07	24
Total	84	51	135

Results

Excellent	54	57.5%
Very good	58	19%
Good	12	12.8%
Fair	06	6.5%
Poor	04	4.2%

Good and above	84	89.4%
Fair and poor	10	10.6%

DISCUSSION

Nail bed injury is one of the most common hand injuries in children. Even though controversy exists regarding the management of minor nail the injuries it is university accepted that severe nail bed injuries should be repaired to minimize long time deformities. The long finger was most commonly injured because it pretends beyond the other fingers. The distal and middle third of the nail bed was most often injured for the same reason.

Crush injury between two heavy objects seems to be the most common mechanism as the doors are very frequently seen in our houses. When children tend to hold the doors to stand up and the doors closes suddenly due to various reasons crushing the finger tips. Male children seem to more commonly injure in the ratio of 3:2.The result of simple lacerations with intact nail plate was much better than crushed, avulsed nail bed with nail plate .In Fact most of the deformities are seen in nail bed which was just approximated as the vascularity of the finger tip was sluggish.

Fracture of the distal phalanx was 70% much higher than the accepted incidence in other studies(i.e.50%) this may be explained basing on the severity of the nail bed injuries Surprising most of the finger tips which had sluggish circulation recovered and survived. But only 20% required time fixation as others could be conservatively managed after nail bed repair except for dip tip in few cases, yet we don't suggest aggressive nail bed repair in very sluggish finger tips.
We commonly used tension band suture to retain the nail plate, which decrease the incidence of fracture fixation and made the post op care little easy.

Results that seemed to be most important to our patients fell into functional and cosmetic categories. As assessed by patient complaints, nail splitting was the most serious problem. Nail roughness, which caused snagging and enough lack of adherence to gather dirt and cause catching, and bending, were also major complaints, hence the major categories. If the nail was greater than two thirds adhered, significant problems were not encountered and the deformity was primarily cosmetic. The minor deformity categories were primarily cosmetic.

CONCLUSIONS

1. Surgical repair of the nail bed in children gives a reliable good functional and cosmetic outcome.
2. Nail plate replacement and fixation is as important as the repair.
3. Nail plate need to be just elevated from the nail bed in most of the injuries.
4. Complications of sever nail bed injuries can be decreased by care full fold and nail bed repair.

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