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(RESEARCH ARTICLE)

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Outcomes of primary nailbed repair in nailbed injury

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Abstract

Hand injuries, particularly nailbed injuries, significantly impact patient functionality and aesthetics. This hospital-based descriptive study, conducted at North Okkalapa General Hospital (NOGH) between January 2015 and December 2016, examines the outcomes of primary nailbed repair in 70 patients with sterile matrix injuries (grades S II, S III, S IV). The study evaluates anatomical and functional outcomes at 6 and 9 months post-operation using esthetic classification. Results indicate that 62.9% of patients achieved good anatomical outcomes, while 37.1% had fair outcomes. Complications were minimal, with nail ridges and dull nails being the most common. This study underscores the importance of timely and standardized surgical intervention in achieving favorable results.

Keywords: Hand Injury; Nailbed; Nailbed Injury; Sterile Matrix; Anatomical Outcome

1. Introduction

Hand injuries are often encountered by healthcare providers worldwide, accounting for 16.62% of total admissions to the orthopedic department at North Okkalapa General Hospital (NOGH). On average, approximately 30.16 patients are admitted each month due to hand injuries [14].

The treatment of hand injuries is particularly crucial, as optimal hand function is essential for maintaining employment and supporting a family. Among the various parts of the hand, the perionychium—the area surrounding the nail—is the most commonly injured, largely due to the prominence of the nail at the fingertip.

Nailbed injuries are commonly linked to various finger injuries. Research indicates that patients with a subungual hematoma affecting more than 50% of the nail have a 60% chance of requiring nailbed repair [1,2]. Additionally, every patient with a fractured distal phalanx has been found to have a nailbed laceration that necessitates repair. When nailbed injuries are managed conservatively, they often result in a distorted nail and a sensitized, scarred distal tip [8,21].

The fingernail fulfills numerous functions that are often taken for granted in our daily use of hands. Beyond their aesthetic appeal, healthy nails play a crucial role in safeguarding the distal phalanx, the tip of the finger, and the nearby soft tissues from injuries. Additionally, it enhances the precision of delicate movements in the distal digits by providing counter-pressure against the pulp of the finger. This mechanism allows the nail to act as a counterforce when the fingertip makes contact with an object, thereby improving sensitivity, despite the absence of nerve endings in the nail itself. An abnormal nail presents both functional and cosmetic challenges [5,23].

While specialists are essential for optimal treatment of certain injuries, the initial care provided by first-line responders can significantly influence the ultimate outcome. Accurate evaluation and proper basic care can greatly enhance recovery and reduce the risk of long-term disability.

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Nail bed injuries are frequently encountered in the Emergency Department of the Orthopaedic Unit at NOGH. The nail plays a crucial role in supporting the finger pulp, enhancing tactile sensation, improving pinch grip, and contributing to overall aesthetics. Conservative management and secondary repair methods have shown a high incidence of post-traumatic nail deformities. According to statistics from NOGH in 2012, hand injuries accounted for 7.8% of total admissions, with crush injuries comprising 66% of all hand injuries. In 2013, the monthly admission rate for fingertip injuries was approximately 5.6%, translating to about 12 patients per month [14].

In our emergency department, we have been performing primary nail bed repairs using various techniques and suture materials. Adopting standard repair methods alongside standardized suture materials is expected to yield better outcomes [15,16].

As our country develops, patients' demands are higher than ever for optimal outcomes. Timely surgical intervention, with a thorough understanding of nail bed anatomy and physiology, is crucial to minimize deformity and morbidity [11,22].

Hand injuries account for up to 30% of emergency department cases. The prevalence of hand and wrist injuries lies between 10 and 30% of all presentations in the emergency department. Each year, approximately one million individuals require emergency medical attention due to severe hand injuries [17,20].

2. Materials and methods

2.1. Design of study

Hospital based descriptive study

2.2. Study place

North Okkalapa General Hospital, Orthopaedic department

2.3. Study population

2.3.1. Inclusion criteria

Sterile matrix injury of grade S II, S III, S IV [24]

Table 1 Van Beek germinal matrix injury classification [24]

Grade	Description
G I	Small subungual hematoma (<25%)
G II	Germinal matrix laceration, large subungual hematoma (50%)
G III	Germinal matrix laceration and fracture
G IV	Germinal matrix fragmentation
G V	Germinal matrix avulsion

Table 2 Van Beek sterile matrix injury classification [24]

Grade	Description
S I	Small nail hematoma (<50%)
S II	Sterile matrix laceration, large subungual hematoma 50%
S III	Sterile matrix laceration, tuft Fracture
S IV	Sterile matrix fragmentation
S V	Sterile matrix avulsion

2.3.2. Exclusion criteria

- Sterile matrix injury of S I, S V [24]
- Nail bed injury in patients with Diabetes mellitus, peripheral vascular diseases,
- Rheumatoid arthritis and preexisting nail deformities.

2.4. Study period

1st January 2015 to 31st December 2016

2.5. Procedure

At presentation, each patient's demographic information, including age, past medical history, hand dominance, and mechanism of injury was recorded. All patients underwent a thorough clinical examination under digital nerve block, with removal of the nail plate, wound irrigation, and debridement of devitalized tissue. Each patient received tetanus prophylaxis and a single dose of intravenous cefuroxime in the emergency department. Laceration characteristics, as well as the time required to perform the nail bed repair using each treatment method, were documented. The treatment time was defined as the total elapsed time from the moment the tourniquet was applied to the time the nail plate was secured under the eponychial fold. Nail bed repair included the use of either 7-0 or 6-0 chromic suture material. After the nail bed repair, the nail plate was secured under the eponychial fold with suture. A non-adherent sterile dressing was then applied to the affected digit, and each patient was discharged with a 5-day course of cephalexin for prophylaxis against Infection. Follow-up evaluation included a wound check at 1 week after repair and examinations at 1 month, 3 months and 6 months and 9 months. At each follow-up visit, will examine functional outcome and cosmetic outcome.

2.6. Ethical consideration

When the case of nailbed injury arrives, the patient will be diagnosed and be explained about my research and taken consent. The cause and mechanism of injury will be assessed from history taking and physical examination and from X-ray. All the patient's personal data and records will be kept confidentially.

2.7. Sample size

n = { p (100 – p) }/ e2

if p = 140 patients n = 89 patients

2.8. Data collection method

- Observing
- Face to face interviewing
- Administering written questionnaire

3. Results

A hospital based descriptive study was carried out in North Okkalapa General Hospital, starting form January 2015 to December 2016. Seventy patients are participated in the study. Total 70 patients with nail bed injury were participated in the study.

Table 3 Distribution of Etiological findings

Etiology	No. of cases	Percentage
Door Injury	23	32.9
Crush	32	45.7
Hummer	15	21.4
Total	70	100.0

According to the table, Crush is the most common etiological finding among study population. Others are 23 patients with door injury and 15 patients with hummer.

Table 4 Distribution of Affected sides and digits involved

	Thumb	Index	Middle	Ring	Little	Total
Right	22	14	5	4	3	48
Left	8	5	4	2	3	22

According to the table, most of the patients affected at Right side rather than Left side. In both right and left side, Thumb finger and Index finger are most affected in the study population.

Table 5 Distribution of Anatomical outcome

	No. of cases	Percentage
Good	44	62.9
Fair	26	37.1
Poor	0	0
Total	70	100.0

According to the table, there are 44 patients with good anatomical outcome and 26 patients with fair anatomical outcomes among the study population.

Table 6 Distribution of Complications

Complications	No. of patients (n=70)	Percentage on total patients
Nail Ridges	3	4.29
Split Nail	0	0.00
Non-adherence	0	0.00
Absence	0	0.00
Nail Spikes, Cysts, and Cornified Nail Bed	0	0.00
Eponychial Deformities	0	0.00
Hyponychial Deformities	0	0.00
Dull Nail	2	2.86
Total	5	7.14

According to the table, there are 3 patients with Nail Ridges and 2 patients with dull nails. There are no patients with complication such as split nail, non-adherence, absence, nail spikes, cysts and cornified, eponychial deformities and hyponychial deformities.

4. Discussion

Nailbed injuries are a frequent occurrence in hand trauma cases and necessitate prompt and precise surgical intervention to ensure optimal recovery. Our study focused on primary nailbed repair using standard techniques and suture materials. The results demonstrated that a significant proportion of patients (62.9%) achieved good anatomical outcomes, which aligns with existing literature emphasizing the benefits of early intervention and proper technique.

The distribution of etiological factors revealed that crush injuries were the most common cause, followed by door injuries and hammer injuries. This highlights the need for preventive measures in high-risk activities and environments. Additionally, the study found a higher incidence of injuries on the right side, particularly affecting the thumb and index finger, underscoring the vulnerability of these digits in daily activities.

Complications were relatively rare, with nail ridges and dull nails being the most frequently observed issues. This low complication rate reflects the effectiveness of the primary repair techniques employed. However, the study's exclusion criteria, such as preexisting conditions like diabetes and rheumatoid arthritis, may have contributed to the favorable outcomes observed. This is a testament to the importance of the nail in enhancing fine motor skills and tactile sensation, which are crucial for hand functionality.

5. Conclusion

This study highlights the positive impact of primary nailbed repair on both anatomical and esthetic outcomes in patients with sterile matrix injuries. The findings support the use of standardized repair techniques and suture materials in achieving favorable results, with minimal complications. Future research should focus on long-term outcomes and the development of preventive strategies to reduce the incidence of nailbed injuries.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical approval for data collection was taken from University of Medicine 2 ethical board.

Statement of informed consent

Informed consent was obtained from all patients included in the study.

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