



Original article

Short-term functional and aesthetic outcomes of fingertip injuries in Kumasi, Ghana

Résultats fonctionnels et esthétiques à court terme des blessures du bout des doigts à Kumasi, Ghana

EK Tano*¹, EJK Adu², J Boakyee – Yiadom³, ADB Buunaaim⁴, PF Tano¹,
PKS Fiifi-Yankson¹, PE Hoyte-Williams²

Résumé

Contexte : Les doigts sont utilisés pour plusieurs types d'activités quotidiennes, notamment l'alimentation, l'écriture, les loisirs et la construction. Le bout des doigts est la partie la plus souvent blessée de la main. Des blessures au bout des doigts peuvent survenir lors d'accidents à la maison ou sur le lieu de travail. Le nombre croissant de complications liées à la prise en charge des blessures au bout des doigts et l'insatisfaction des patients concernant les activités de la vie quotidienne et l'apparence esthétique après traitement rendent indispensable une étude comparative sur les résultats fonctionnels et esthétiques des blessures au bout des doigts en utilisant un traitement conservateur et l'utilisation de lambeaux.

Méthodologie : L'étude était une enquête prospective auprès de patients présentant des blessures au bout des doigts au Centre des accidents et des urgences de l'hôpital universitaire Komfo Anokye (KATH) à Kumasi. Un échantillonnage aléatoire simple a été utilisé pour sélectionner les patients. Les sujets de l'étude comprenaient des patients blessés au bout des doigts qui se sont présentés à KATH de février

2017 à janvier 2018. Ces patients ont été soit pris en charge de manière conservatrice, soit traités avec des lambeaux.

Résultats : Au total, 59 patients ont participé à l'étude. La répartition par âge variait de 1 an à 68 ans avec un âge moyen de $26,9 \pm 17,5$. La majorité des patients étaient des hommes. La cause la plus fréquente de blessures était les blessures par écrasement 28 (47,5 %), la plupart étant des blessures causées par des portes et des machines. Dans la prise en charge des lésions du bout des doigts, le débridement et le pansement constituaient le traitement le plus élevé (51 %) reçu par les patients, le pansement seul (29 %), et le moins de plan de prise en charge par lambeaux enregistré (20 %). Parmi les patients traités par lambeaux, 8 (66,7 %) étaient des lambeaux d'avancement en V-Y, 2 (16,7 %) étaient des lambeaux d'avancement en V-Y bilatéraux, tandis que seulement 1 (8,3 %) étaient respectivement un lambeau de Moberg et un lambeau croisé. Il y avait une signification statistique ($p = 0,04$) entre le type de traitement et le résultat esthétique (forme de l'ongle).

Conclusion : Malgré le degré variable d'insatisfaction quant à l'apparence du doigt après le traitement, la

majorité des patients étaient satisfaits des résultats esthétiques et fonctionnels de leur traitement. Par conséquent, l'une ou l'autre méthode de traitement peut être utile avec un résultat satisfaisant en fonction des indications qu'elle contient.

Mots-clés : bout du doigt, esthétique, fonctionnel, résultat, lambeau, Ghana.

Abstract

Background: The fingers are used for several kinds of daily activities including eating, writing, recreation and construction. The fingertips are the most commonly injured part of the hand. Fingertip injuries can occur in accidents at home or the workplace. The increasing number of complications from fingertip injury management and patients' dissatisfaction concerning activities of daily living, and cosmetic appearance after treatment makes it essential for a comparative study on the functional and aesthetic outcomes of fingertip injuries using conservative treatment and the use of flaps.

Methodology: The study was a prospective survey of patients presenting with fingertip injuries at the Accident and Emergency Centre, Komfo Anokye Teaching Hospital (KATH) in Kumasi. Simple random sampling was used to select the patients. Study subjects included patients with fingertip injuries presenting at KATH from February 2017 to January 2018. These patients were either managed conservatively or treated with flaps.

Results: A total of 59 patients participated in the study. The age distribution ranged from 1 year to 68 years with a mean age of 26.9 ± 17.5 . The majority of the patients were males. The most common cause of injury was crush injury 28 (47.5%), most of them being doors and machine mangling injuries. In the management of fingertip injuries, debridement and dressing constituted the highest (51%) treatment received by the patients, wound dressing only (29%), and the least management plan using flaps recorded (20%). Amongst the patients treated with flaps 8 (66.7%) were V-Y advancement flaps, 2 (16.7%) were bilateral V-Y advancement flaps, whereas only

1 (8.3%) were each Moberg flap and cross-finger flap respectively. There was a statistical significance ($p = 0.04$) between the type of treatment and aesthetic outcome (nail shape).

Conclusion: Despite the varying degree of dissatisfaction with the appearance of the finger after treatment, the majority of patients were satisfied with both aesthetic and functional outcomes of their treatment. Therefore, either treatment method can be useful with a satisfactory outcome depending on the indications therein.

Keywords: fingertip, aesthetic, functional, outcome, flap.

Introduction

The fingertip is the part of the finger that is distal to the insertions of the flexor and extensor tendons (1). It includes: the glabrous skin, the perionychium (nail complex), and subcutaneous fat which contains fibrous septae, nerves, arteries and distal phalanx (2, 3). The nail complex is made up of a sterile matrix, germinal matrix, hyponychium, paronychium, eponychial fold and the nail plate (1, 4).

Fingertip injuries cause significant morbidity within workplaces in Africa (5), (6). Fingertip injuries are common injuries seen at the Accident and Emergency Centre of the Komfo Anokye Teaching Hospital (KATH), Kumasi. In managing fingertip injuries, aesthetic and functional considerations must be addressed by clinicians since the hands and face are the most conspicuous parts of the human body (7).

The objective of this study is to compare the functional and aesthetic outcomes between conservative treatment and surgery using flaps in the management of fingertip injuries at KATH.

Methodology

A prospective study of patients with fingertip injury seen at the Accident and Emergency Department of Komfo Anokye Teaching Hospital, in Kumasi, from

February 2017 to January 2018 was undertaken. The inclusion criteria were: Patients one year and above presenting with fingertip injuries at KATH. Patients with injuries including burns, crush injuries, bites, sharp objects and other traumatic injuries to the fingertip. Fingertip injuries amenable to conservative treatment :(a) Fingertip injuries with bone exposed that has less than 2mm of soft tissue covering the bone. (b) Fingertip injuries without bone exposed. Fingertip injuries amenable to the use of flaps: Fingertip injuries with skin loss causing exposure of the underlying bone or tendon. Fingertip injuries with the need for preservation of length of the digit.

All patients with polytrauma, diabetes mellitus, sickle cell disease, severe head injury and smokers were excluded from the study.

Approval to carry out this study was obtained from the Committee of Human Research and Publication Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology (KNUST), Kumasi with reference number CHPRE/AP/107/17.

Signed consent was sought from patients or in the case of minors, from their parents or legal guardians. Patients presenting with fingertip injuries at KATH within the study period were screened at the triage section of the Accident and Emergency Centre as well as the Reconstructive, Plastic surgery and Burns Unit out-patients department.

Sociodemographic data included name, age, sex, site of the injured finger/fingers, occupation and hand dominance. The patients were examined to determine which part of the hand was injured. X-rays of the injured hands were taken. Fingertip injuries amenable to conservative treatment were those fingertip injuries without bone exposure and fingertip injuries with bone exposed that have less than 2mm of soft tissue covering the bone. For such injuries, a few millimeters of the bone will be nibbled away to allow good cover with soft tissue. Conservative treatment of fingertip injuries involved wound dressing only or debridement and wound dressing. The dressing was done using Vaseline gauze and a Coban bandage on alternate days.

Fingertip injuries amenable to surgical treatment were those with skin loss causing exposure of the underlying bone or tendon as well as fingertip injuries which required preservation of length of the digit. Flaps used were V-Y, Moberg, and cross-finger flaps. Complications arising out of the management of these injuries were addressed either by conservative treatment or any other form of treatment such as skin grafting or secondary suturing after revision of the stump. Patients were followed up closely with reviews in the wards and after discharge for six months. For both conservative and surgical treatment modalities, patients were given either general, regional or local anaesthesia in the form of a digital block with 1% plain xylocaine at a dose not exceeding 3mg/Kg. Tourniquet was applied to the arm or digit when necessary and optical loupes were used at surgery.

The conservative treatment was carried out with a team of nurses in the Reconstructive, Plastic surgery and Burns Unit. Follow-up on patients was done under the supervision of the consultant plastic surgeon. Patients had early close follow-up within the first 2 weeks looking at post-procedure complications such as pain, bleeding, flap necrosis, infection and gangrene. The functional outcome was assessed using the modified Sheridan and McCauley classification for injuries of the hand. The aesthetic outcome was assessed by the participants and a team of independent surgeons using the parameters: length of the finger, shape, appearance, colour and nail shape.

The study employed both descriptive and inferential statistics in analyzing the data. A sample t-test was done to ascertain the difference between age groups and recovery time.

The analysis in this study was narrowed to cases that were reported at the emergency department and reconstructive plastic surgery and burns outpatient department during the study period. Statistical significance was set at the standard p-value of 0.05 with a 95% confidence interval. The Analysis was carried out using STATA 15.0 version statistical software.

Results

The mean age of the patients was 26.9 ±17.5 years. Sixty-five out of 192 patients attending the Accident and Emergency Department of KATH presented with fingertip injuries within the period of the study. Of the 65 patients with fingertip injuries, 6 patients dropped out of the study due to incomplete data (like what?). In all, 59 patients were selected for analysis. The male: female ratio was 7:5. For educational level among patients, almost half, 29 (49.2%) were primary/junior high school (JHS) leavers. More than half, 42 (71.2%) of the patients were single and 12 (22.0%) were married (Table 1).

Table 1: Demographic characteristics of patients

Variables	Frequency (N=59)	Percentage (%)
Age (years, mean ±SD)	26.9±17.5	
Gender		
Male	32	54.2
Female	27	45.8
Educational Background		
Preschool	17	28.8
Primary/JHS	29	49.2
Secondary	9	15.3
Tertiary	4	6.8
Marital Status		
Single	42	71.2
Married	13	22.0
Divorced	4	6.8

Crush injury 28 (47.5%) was the most common cause of injury, followed by blunt injury 24 (40%) and injury from sharp objects 7 (11.9%). More than half of the blunt injuries were found to be pestle-mortar injuries. The digits involved in the injury were the middle finger 27 (45.8%), followed by the ring and index 12 (20.3%) and 11 (18.6) respectively. The little finger 3 (5.1%) was the least involved in the injury. The majority of the injuries involved the right hand 36 (61.0%). On the right hand, 55 (93.2%) was the dominant hand (Table 2).

Table 2: Clinical Presentation of Patients with Fingertip Injury

Variables	Frequency (N=59)	Percentage (%)
Aetiology of injury		
Crush injury	28	47.5
Blunt injury	24	40.7
Sharp Objects	7	11.9
Type of Digit involved		
Thumb	6	10.2
Index	11	18.6
Middle	27	45.8
Ring	12	20.3
Little	3	5.1
Hand Involved		
Left	23	39.0
Right	36	61.0
Dominant Hand		
Left	4	6.8
Right	55	93.2

Treatment of Fingertip injury

All patients had some form of management for their fingertip injuries. Debridement and dressing constituted the highest (51%) treatment received by the patients, dressing only (29%) and using flaps (20%) (Figure 1).

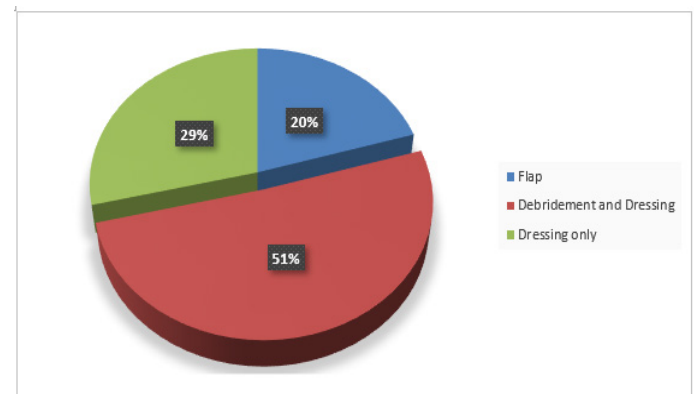


Figure 1: Type of Treatment of fingertip injuries

12 patients were treated with various types of flaps: 8 (66.7%) were V-Y advancement flaps, 2 (16.7%) were bilateral V-Y advancement flaps, and 1 (8.3%) were Moberg flap and cross-finger flap (Figure 2).

6 days. A majority, 49 (83.0%) fell within the recovery time category of 15 days and above, and 10 (17.0%) fell in less than 15 days category (Table 3).

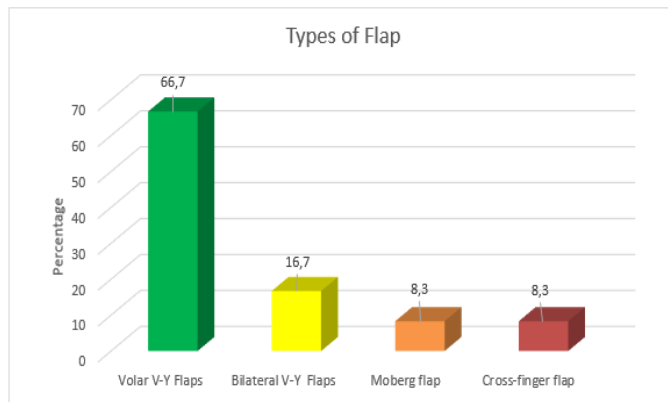


Figure 2: Types of Flap

Recovery time was a key factor in the management of fingertip injuries. The recovery time distribution of the 59 patients ranged from 11 to 29 days with a mean of 20.8 ±5.5 which is approximately three weeks and

Table 3. Recovery time of Patients

Variable	Frequency (N=59)	Percentage (%)
Recovery time (Days, mean ±SD)	20.8 ± 5.5	
Recovery time		
11 – 14 days	10	17.0
15 – 29 days	49	83.0

Patients' recovery time was compared with the type of treatment used. An average healing time for dressing only, debridement and dressing and flap were 17, 22 and 24 days respectively. Concerning age, paediatric patients recovered earlier than adults with an average healing time of 16 and 23 days respectively. There was a mean difference between recovery time and age with a P value of 0.001 (Table 4).

Table 4: Means and SD of Recovery time in relation with type of treatment and Age

Variables	Observation	Mean	Standard Deviation	Min	Max
Dressing only	17	17.2	± 3.5	12	22
Debridement and Dressing	30	21.8	± 5.3	11	29
Flap	12	23.8	± 5.8	15	29
Less 15 years	17	16.1	± 4.2	11	28
15 years and above	42	22.8	± 4.7	14	29

There is a mean difference between recovery time and age with P value (0.001)

Functional and Aesthetic outcome of Fingertip injuries

The following functional outcomes in terms of the difficulties in activities of daily living were assessed; writing, holding books or newspapers, holding a phone while talking and engagement in household chores. Among the various functional outcomes assessed, 4(6.8%) had more difficulty in writing,

14 (23.7%) had moderate difficulty, and 41 (69.5%) had no difficulty. Two (3.4%) found holding a book or newspaper more difficult after the treatment, 21 (35.6%) had moderate difficulty, and 36 (61.0%) had no difficulty at all. Five (5) (8.5%) found holding a phone when talking very difficult after the treatment, 19 (32.2) had moderate difficulty, and 35 (59.3%) had no difficulty at all. This study further reveals that 2 (3.4%) found it very

difficult to perform their house chores after the treatment. 21 (35.6%) had moderate difficulty; 36 (61.0%) had no difficulty at all.

Table 5: Functional outcome

Variables	No Difficulty N (%)	Moderate Difficulty N (%)	More Difficulty N (%)
Writing	41 (69.5)	14 (23.7)	4 (6.8)
Holding of book or news paper	36 (61.0)	21 (35.6)	2 (3.4)
Holding a phone and talking	35 (59.3)	19 (32.2)	5 (8.5)
Household chores	36 (61.0)	21 (35.6)	2 (3.4)

This study further assessed the satisfaction of the patients with the treatment they received based on the aesthetic outcome. This included the length, shape, appearance, and colour of the finger and nail shape. Out of the total sample population, 27(45.8.0%) were not satisfied with the length of the finger though the majority were satisfied with the length of their finger. 26 (44.1%) and 29(49.2%) were not satisfied with the shape and colour of the finger respectively though satisfaction was recorded in the majority of them. The majority of the patients 34(58.0%) were not satisfied with the shape of the nail.

Table 6: Satisfaction with Aesthetic outcome

Variables	Yes N (%)	No N (%)
Length of the finger	32 (54.2)	27 (45.8)
Shape	33 (55.9)	26 (44.1)
Appearance	30 (50.9)	29 (49.2)
Colour	25 (42.4)	34 (57.6)
Nail shape	25 (42.4)	34 (57.6)

Except for nail shape in which there was a statistically significant difference (p-value = 0.043) between satisfaction after treatment with flap and satisfaction after conservative treatment, no statistically significant difference was identified with any of the treatments based on length of the finger (p-value = 0.10), the shape of the finger (p-value = 0.265), the appearance of the finger (p-value = 0.467), and colour of the finger (p-value = 0.172). The majority of the patients who were treated with flap were dissatisfied with the aesthetic outcome of the finger length 8(66.7%), shape 7(48.3%), appearance 7(58.3%), colour 9(75.0%), nail shape 10(83.3%) (Table 6).

Table 7: Relationship between type of treatment and Aesthetic outcomes

Variables	Treatment		Chi Square value	P value
	Flap	Conservative		
Length of finger			2.6521	0.10
Satisfied	4 (33.3)	28 (59.6)		
Dissatisfied	8 (66.7)	19 (40.4)		
Shape			1.2437	0.265
Satisfied	5 (41.7)	28 (59.6)		
Dissatisfied	7 (48.3)	19 (40.4)		
Appearance			0.5080	0.476
Satisfied	5 (41.7)	25 (53.2)		
Dissatisfied	7 (58.3)	22 (46.8)		
Colour			1.8619	0.172
Satisfied	3 (25.0)	22 (46.8)		
Dissatisfied	9 (75.0)	25 (53.2)		
Nail shape			4.0766	0.043
Satisfied	2 (16.7)	23 (48.9)		
Dissatisfied	10 (83.3)	24 (51.1)		

Discussion

Fingertip injuries are among the commonest injuries presenting at the Emergency unit of the KATH, Kumasi. In this study, the majority were in the age group of 15 years or more. The majority of the patients were males. Sanjay and Tiwari (2007) studied patients whose demographic distribution was consistent with the findings of this present study. In their study, the patients had a mean age of 34.6 (± 22.1) with the majority of the participants being males (8). The male dominance could be attributable to the increased exposure of males to occupational hazards as compared to females. Alexander et al (2017) in their study comprising 240 patients from a tertiary care centre had more males presenting with

nail bed injuries compared to females (9). The mean age of the patients was 37.3 years (range 1-66 years). This was inconsistent with the findings of this present study.

Regarding the distribution of the place of injury, most of the patients in this study were injured at home followed by injury at the workplace. Yorlets et al, (2017) in their descriptive study on Fingertip Injuries in children, found consistent results in which the most common injuries occurred at home (10).

This present study reported on the recovery time of the patients which is a key factor in the management of fingertip injuries. The mean recovery time for the patients was 20.8 (± 5.5) days indicating that a substantial majority of the patients recovered 15 days or more after treatment. The study further

assessed the mean recovery time with the category of treatment and the age of patients. Patients who were treated with debridement and dressing recovered within a mean of 21.8 (\pm 5.3) days. Patients treated with dressing only recovered within a mean of 17.2 (\pm 3.5) days and those treated with flap recovered within 23.8 (\pm 5.8) days except for those with flap necrosis. Patients with partial flap necrosis were treated with dressing only and recovered within 31 days while those with total flap necrosis that were treated with wound debridement and split-thickness skin grafting recovered within 37 days. A study by Achilleas et al (2010) agrees with these findings and reported in their study that closure of a fingertip amputation under tension remains a problem that put the flap at risk of partial or total necrosis, therefore prolonging the recovery period of the patient (11). The pediatric patients recovered earlier within 16 days after treatment as compared to the adult patients who recovered 23 days after treatment. The functional outcome of the management of the finger injuries was assessed based on the difficulties in performing the activities of daily living. From this study, about 70% of the patients were found to have no difficulty in writing. Sixty-six percent had no difficulty in handling a book or newspaper. Fifty-nine percent had no difficulty in holding and talking on the phone and about 60% had no difficulty in doing household chores.

In a study on conservative treatment of fingertip injuries, Cerny et al., (2018) agree with the findings of this study in which all the patients were very satisfied with the results of the procedure with regards to the improvement in hand functions at work and other daily routine activities (12).

There was no statistically significant association between the type of treatment and overall aesthetic outcomes in patients in this present study. This observation is inconsistent with reports from the functional and aesthetic reconstruction of fingertip and pulp defects with pivot flaps by Chen et al., (2012) in their study in which all patients were satisfied with the appearance of the reconstructed fingertips (13).

Conclusion and recommendation

This study revealed that most patients were managed conservatively with debridement and dressing or dressing alone using Vaseline gauze. The overall functional outcomes of treatment were found largely to be dependent on the type of treatment. Few patients were dissatisfied with poor outcomes associated with flaps especially the length of their fingers. Despite the varying degree of dissatisfaction with the appearance of the finger after treatment, the majority of patients were satisfied with both aesthetic and functional outcomes of their treatment regardless of the treatment method used.

To ensure high patient satisfaction, it is recommended that the use of flap as a modality of treatment must be done in a way that minimizes its complications. For excellent clinical outcomes, it is recommended that treatment of fingertip injuries should consider the age, sex, hand dominance, digit injured, and mechanism of injury as well as the occupation of the patient.

Data availability: Dataset used to support the findings of this study is available from the corresponding author on reasonable request.

Conflict of interest: No conflict of interest regarding this work

Authors' Contribution: EKT AND EJKA conceptualized the idea and designed the study. EKT and JBY, PFT collected and cleaned the data Supervised by EJKA. AD.B.B and EJKA made academic inputs into the design and manuscript write-up. All authors read and made inputs to the final manuscript.

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***Correspondence**

Emile Kouakou Tano

kanot2001@yahoo.com

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- 1 : Department of Surgery, Komfo Anokye Teaching Hospital, Kumasi, Ghana
- 2 : Department of Surgery, School of Medicine and Dentistry, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
- 3 : Department of Emergency Medicine, Komfo Anokye Teaching Hospital, Kumasi, Ghana
- 4 : Department of Surgery, School of Medicine, University for Development Studies Tamale, Ghana.

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