ISSN: 2692-5370
Anaesthesia & Surgery Open Access Journal
DOI: 10.33552/ASOAJ.2024.05.000616
Iris Publishers

Research Article

Traumatic Soft Tissue Finger Injuries at Mater Dei Hospital, Malta: Epidemiology, Complications and Functional Outcomes

Jessica Dowling[1]* and Juanita Parnis[2]

[1]*Department of Surgery, Mater Dei Hospital, Malta*

[2]*Plastic Surgery Unit, Mater Dei Hospital, Malta*

***Corresponding author:** Jessica Dowling, Department of Surgery, Mater Dei Hospital, Malta

Received Date: October 21, 2024

Published Date: October 25, 2024

Introduction

Introduction: Upper extremities, especially digits, are one of the most injured areas in non-fatal accidents at work. Injuries may vary from sharp to crush injuries. Management may involve conservative management, primary suturing, full thickness skin graft, flap reconstruction, terminalisation or replantation. This study aims to evaluate the epidemiology of traumatic soft tissue finger injuries with tissue loss treated between January and July 2021, focusing particularly on demographics, mechanism of injury, complication rates and functional outcomes.

Method: Data protection clearance was obtained from MDH management. 46 unselected consecutive patients were considered. Descriptive statistics about age, injury site and mechanism were analysed. Categorical variables were evaluated using contingency (cross-tabulation) tables and the $\chi 2$ test. p values <0.05 were considered significant.

Results: The mean age of subjects was 39.59 years. Most injuries occurred in males (n=39, 85%), in the nondominant hand (n=26, 57%) and at the place of work (n= 28, 61%). Protective equipment was not used in most casualties (n=41, 89%). Subjects were managed with change of dressing, prophylactic antibiotics, Tetanus ATT/ATG booster and hand elevation. Some patients required surgery - replantation (n=2, 4%), a skin graft (n=8, 18%), a local flap (n=4, 9%) or terminalisation with primary closure. The commonest complications observed were infection in the conservatively treated cohort (n=3, 6.52%) and partial graft loss in patients who underwent graft repair (n=3, 6.52%). Functional outcomes were measured according to range of movement, grip strength and time to return to work. Hand therapy was only utilised in a small proportion of patients (n=13, 28.26%).

Conclusion: Protective wear is essential to limit occupational hand injuries and hand therapy is an important tool to improve functional outcomes after traumatic soft tissue finger amputations. Larger studies are required for better representation of each management strategy.

Keywords: Trauma; Soft tissue injuries; Finger; Amputation; Complications; Functional outcomes; Hand therapy

Abbreviations: MDH: Mater Dei Hospital

Introduction

Traumatic finger injuries are a common presentation to any Plastic Surgery Unit. Upper extremities, especially digits are one of the most injured areas in non-fatal accidents at work, mostly in manual labourers [1]. Injuries may vary from sharp to crush injuries with different levels of contamination. Damage may occur to bone, tendons, arteries, veins, nerves and nailbed, with management changing depending on the type of trauma. An interprofessional team is required, comprised of plastic surgeons, orthopaedic surgeons, wound care nurses and occupational/hand therapists [2]. Amputation to one or more digits may have a detrimental effect on an individual's functional, social and economic status, hence treatment is essential to regain function effectively.

Management from the plastic surgery point of view, may involve conservative management, primary suturing, full thickness skin graft, flap reconstruction, terminalization or replantation. Conservative management comprises of regular change of dressing, analgesia and antibiotics. Sometimes, when there is loss of tissue in an area, when a lot of soft tissue cover or normal sensation is not required, a full thickness skin graft might be an option. If there is significant injury with tissue loss in an area that requires cushioning over a bone, a local flap is usually the option. In areas where it is preferable to have sensate skin, healing via secondary intention, if possible, or reconstruction with certain types of flaps are the most suitable options. Terminalization involves amputating the injured tip and closing the wound primarily. This is sometimes the preferred option in severe injuries that will result in a useless finger or in manual labourers that would like to return back to work as soon as possible. Replantation is the process of reattaching part of a finger that has been completely cut off. In such case, bones, tendons, arteries, veins and nerves need to be repaired in association with intensive post-operative hand therapy so as to regain good function.

This longitudinal retrospective cohort study aims to evaluate the epidemiology of traumatic soft tissue finger injuries with tissue loss, presenting to the Plastic Surgery and Burns Unit at MDH over seven months, with particular emphasis on demographics, mechanism of injury, complication rates and functional outcomes. In our hospital, only the injuries that have soft tissue loss are referred to the Plastic Surgery Unit. The rest of the injuries are dealt with by the Orthopaedic Team through a dedicated Orthopaedic Trauma theatre list.

Materials and Methods

A total of 46 unselected consecutive patients treated over seven months were included in the study. Data was collected retrospectively, including patients of all ages with traumatic finger injuries and tissue loss. These patients were all managed at the Plastic Surgery and Burns Unit at MDH, between January and July 2021. The cohort incorporated Maltese nationals, foreigners living in Malta and tourists.

Primary outcome measures included analysis of traumatic soft tissue injuries presenting to MDH. Secondary outcomes assessed the management implemented, commonest complications and functional outcomes, including range of movement, grip strength and time to return to work. The data was acquired using the patient register at the Plastic Surgery and Burns Unit Dressings Clinic, online Emergency Medicine documents and Electronic Case Summaries. A questionnaire was sent to patients after completion of therapy at our Dressings Clinic, to be filled in at the time of return to work and completion (if any) of hand therapy follow up. This covered the date and place of injury, use of protective equipment, dominant hand, patient's medical and social history and functional outcomes, as seen in Figure 1.

Descriptive statistics about age, site and mechanism of injury were analyzed. Categorical variables were evaluated using contingency (cross-tabulation) tables and the $\chi 2$ test. For the purposes of this study $p < 0.05$ was considered significant.

Traumatic soft tissue finger injuries at Mater Dei Hospital

Plastic Surgery and Burns Unit, Mater Dei Hospital

Please tick where applicable

ID: _____ Age: _____ Gender: ☐ Female ☐ Male

Date of Injury

_____

Place of Injury

☐ Work
☐ Home
☐ Other
_____

Use of Protective Wear

☐ Yes
☐ No

History

Dominant Hand

☐ Left hand
☐ Right hand

PMH/PSH

☐ Diabetes Mellitus
☐ Fibromyalgia
☐ Previous trauma to same finger
☐ Others
_____
_____

Social History

☐ Non-smoker
☐ Smoker ____/day for ____ years

Occupation: _____

Hobbies: _____

Functional Outcomes

Hand Therapy Follow up

☐ Yes
☐ No

Range of Movement

☐ Full
☐ Reduced

Grip Strength

☐ Normal
☐ Reduced

Return to work in ____ months

Figure 1: Patient Questionnaire used for data collection.

The study was approved by the Chairperson of the Surgical Department, MDH Chief Executive Officer and Legal Office. Data protection clearance was obtained. Data was anonymized and stored on MDH computers. Only the investigators, who are GDPR certified and compliant had access to the data collected. The authors declared no conflicts of interest at the beginning of the study.

Results

46 patients sustained one or more traumatic digit injuries with tissue loss between January and July 2021. A mean of 6.6 patients presented monthly with these injuries. The distribution of accidents per month is shown in Figure 2. Presentations of patients with these injuries were more common during weekdays as seen in Figure 3, with the highest frequency on Tuesdays.

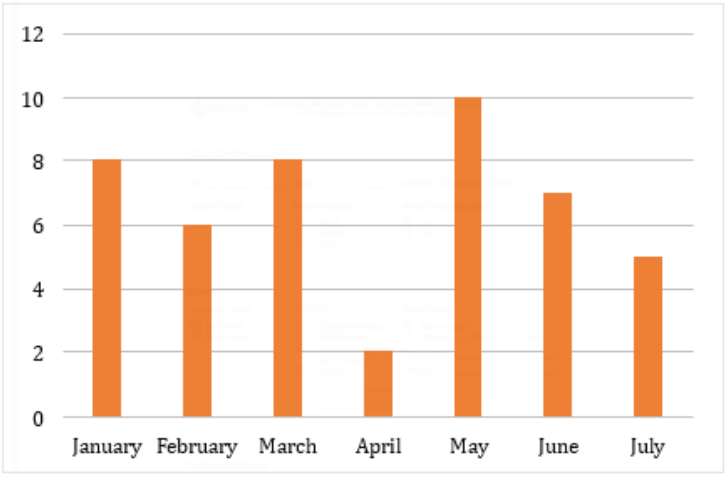

Figure 2: Number of traumatic soft tissue finger injuries by month.

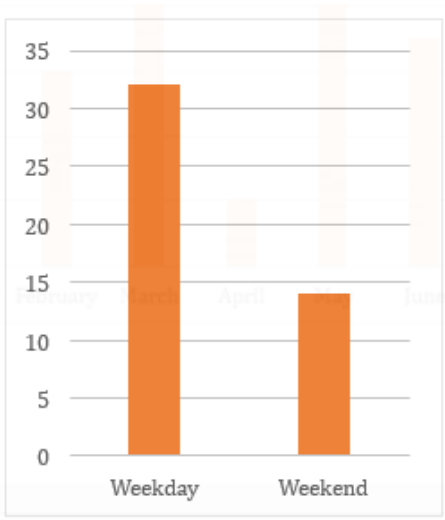

Figure 3: Number of traumatic soft tissue injuries on different days of the week.

The mean age of injury is 39.59 years while median is 38 years (Table 1). Most injuries occurred in males (Figure 4) and in the non-dominant hand (Figure 5).

The commonest place of injury was at the place of work, with construction workers having the most significant number of injuries (Figure 6, Table 2). Most of the casualties were lacking protective wear (Figure 7).

Table 1: Age statistics of sample population.

Age (years)	
Mean	39.59
Median	38
Mode	49
Range	71
Minimum	2
Maximum	73

Table 2: Workplace injuries.

Occupation	Number of Injuries [n (%)]
Construction worker	10 (35.71)
Carpenter	4 (14.29)
Tile layer	3 (10.71)
Butcher	2 (7.14)
Abattoir officer	1 (3.57)
Deliveryman	1 (3.57)
Engineer	1 (3.57)
Landscape Gardener	1 (3.57)
Machinery worker	1 (3.57)
Marble worker	1 (3.57)
Metal worker	1 (3.57)
Plasterer	1 (3.57)
Supermarket	1 (3.57)
attendant	

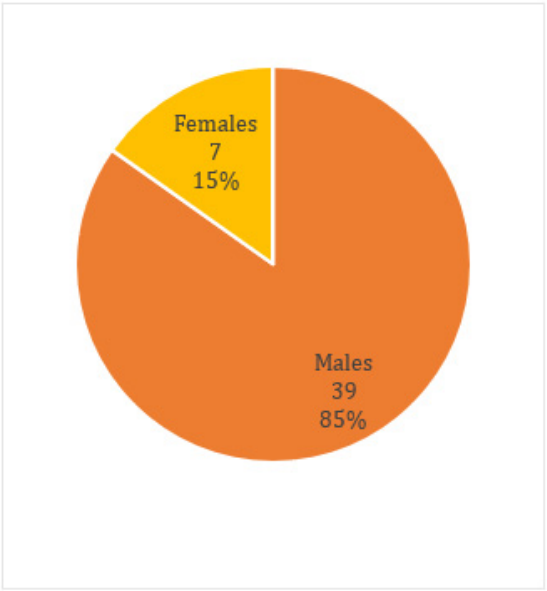

Figure 4: Incidence of male vs female injuries.

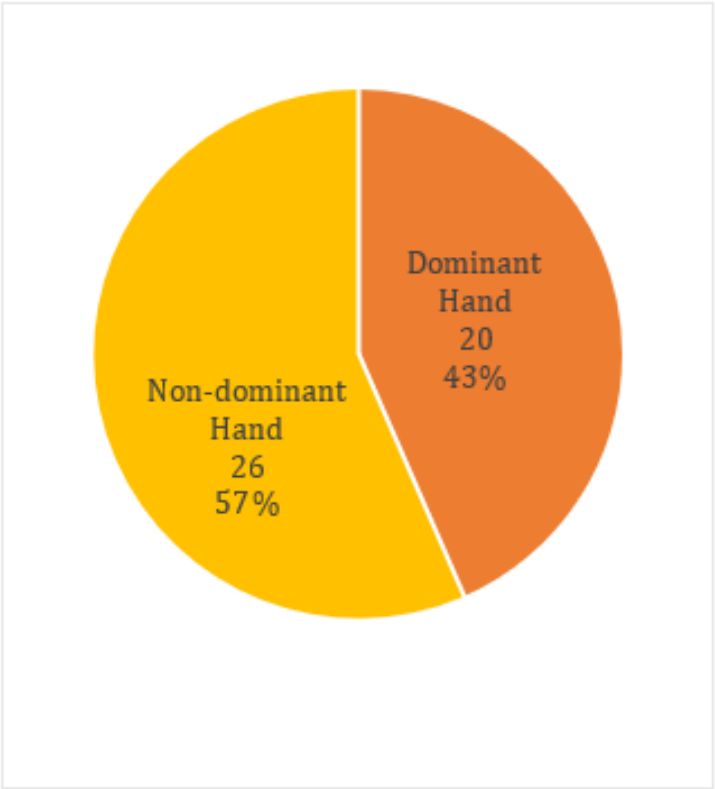

Figure 5: Incidence in dominant vs non-dominant hand.

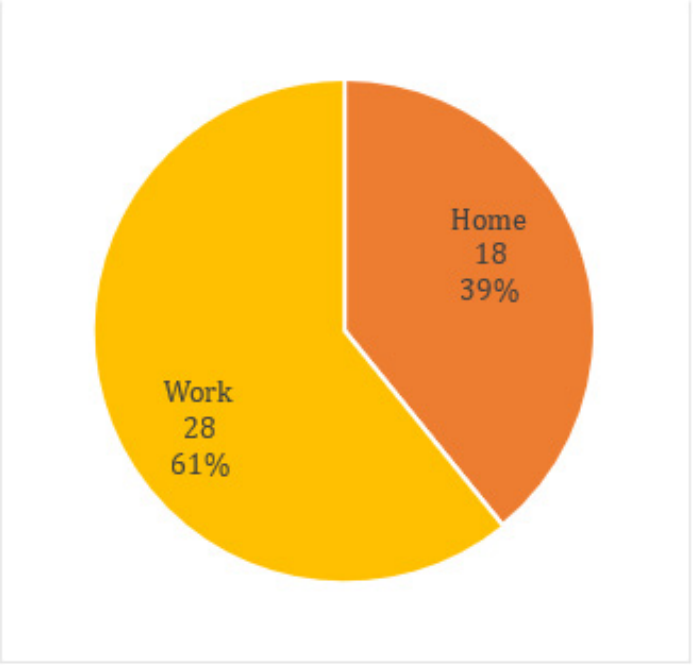

Figure 6: Place of Injury.

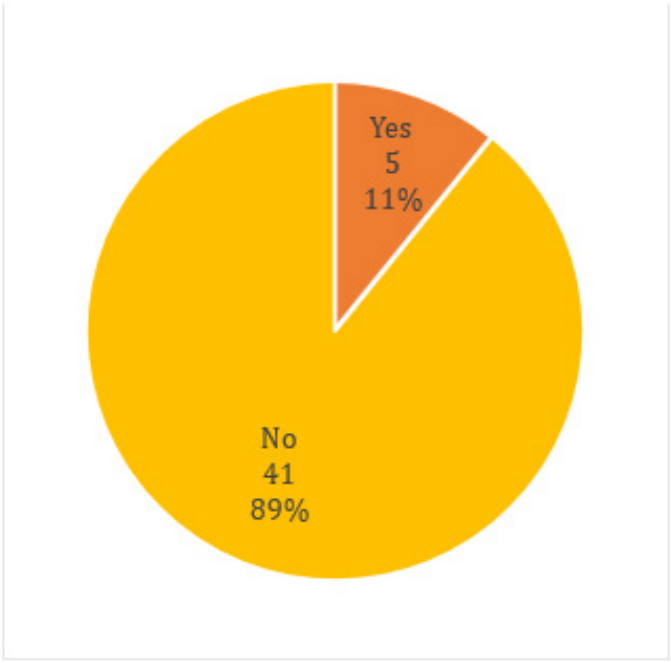

Figure 7: Use of Protective Wear.

Most patients sustained a crush incomplete injury (Table 3) with the commonest site being the index finger of the non-dominant hand from the distal phalanx to the nailbed. Tamai classification was used to classify the injuries, with Tamai 1 denoting injuries from the fingertip to the base of the nail and Tamai 2 referring to damage from the base of the nail to the distal interphalangeal joint. A smaller number of the patients also sustained an injury to more than 1 digit within the same limb.

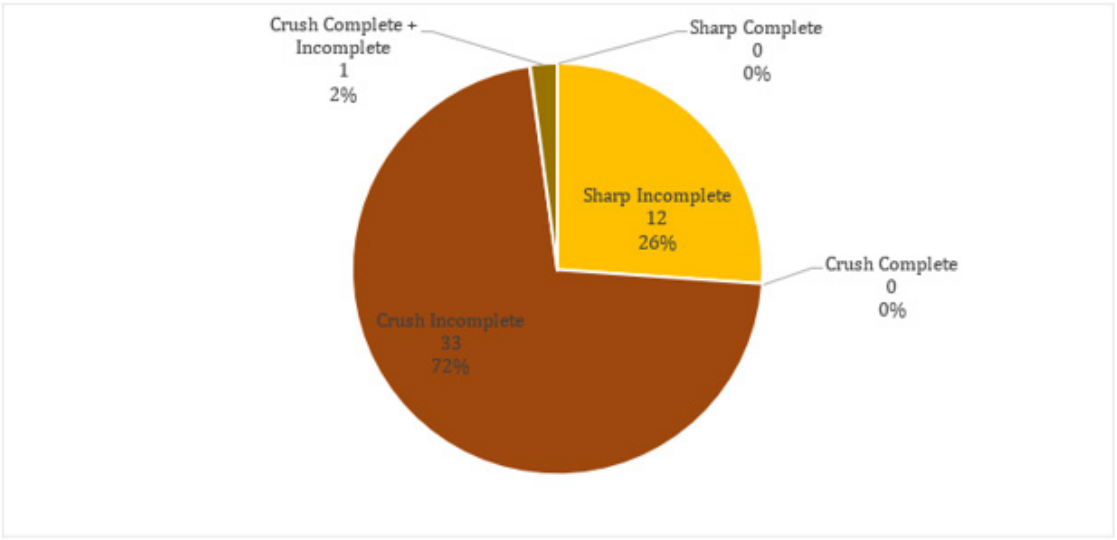

Figure 8: Mechanism of Injury.

Table 3: Site of Injury. Data is presented as n (%).

		Thumb	Index Finger	Middle Finger	Ring Finger	Little Finger	>1 Finger	Total
Dominant	Tip of finger to base of the nail (Tamai 1)	3 (6.52)	2 (4.35)	2 (4.35)	3 (6.52)	2 (4.35)	1 (2.17)	20 (43.48)
	Base of the nail to DIPJ (Tamai 2)	1 (2.17)	0	1 (2.17)	0	0	2 (4.35)	
	Middle Phalanx and PIPJ	0	1 (2.17)	0	0	0	0	
	Proximal phalanx and MCPJ	0	0	0	0	0	0	
	MCPJ	0	1 (2.17)	0	0	0	1 (2.17)	
Non-dominant Hand	MCPJ Tip of finger to base of the nail (Tamai 1)	2 (4.35)	4 (8.70)	2 (4.35)	1 (2.17)	2 (4.35)	6 (13.04)	26 (56.52)
	Base of the nail to DIPJ (Tamai 2)	3 (6.52)	2 (4.35)	2 (4.35)	2 (4.35)	0	0	
	Middle Phalanx and PIPJ	0	0	0	0	0	0	
	Proximal phalanx and MCPJ	0	0	0	0	0	0	
	MCPJ	0	0	0	0	0	0	

DIPJ= Distal Interphalangeal Joint, PIPJ = Proximal Interphalangeal Joint, MCPJ = Metacarpophalangeal Joint

All patients were managed with regular change of dressings suitable for the type of injury that they had and the current state of the wound, prophylactic antibiotics, Tetanus ATT/ATG booster and hand elevation in a triangular bandage. In addition, some patients required surgery with either replantation, a skin graft, a local flap or terminalization (Figure 9). The management instituted was related primarily to type of injury, resulting defect and smoking status. Patient's age, comorbidities, job and hand dominance were also taken into account when planning management. These results are presented in Table 4.

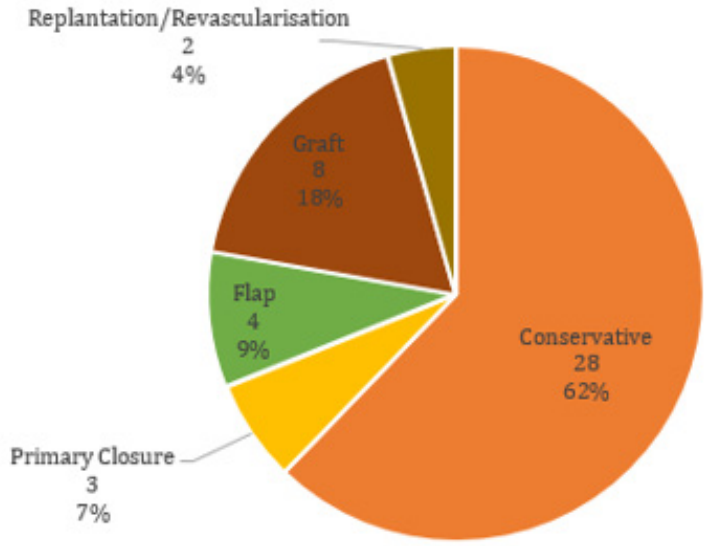

Figure 9: Management of Injuries.

Table 4: Management by Age, Comorbidity, Mechanism of Injury and Hand Dominance. Data is presented as n (%).

	Conservative	Primary Closure	Flap	Graft	Replantation/Revascularisation	Total	ρ Values
Gender							
Male	22 (47.83)	3 (6.52)	5 (10.87)	7 (15.22)	2 (4.35)	39 (84.78)	0.012
Female	6 (13.04)	0	0	1 (1.27)	0	7 (15.22)	
Age (years)							
0-15	4 (8.70)	0	1 (2.17)	0	0	5 (10.87)	0.003
16-30	2 (4.35)	1 (1.27)	0	3 (6.52)	1 (2.17)	7 (15.22)	
31-45	9 (19.57)	1 (1.27)	1 (2.17)	3 (6.52)	1 (2.17)	15 (32.61)	
46-60	8 (17.39)	0	3 (6.52)	2 (4.35)	0	13 (28.26)	
≥61	5 (10.87)	1 (1.27)	0	0	0	6 (13.04)	
Comorbidity							
Previous Injury	5 (10.87)	0	0	2 (4.35)	0	7 (15.22)	0.0132
Smoker	5 (10.87)	0	3 (6.52)	3 (6.52)	1 (2.17)	12 (20.09)	
No comorbidity	18 (39.13)	3 (6.52)	2 (4.35)	3 (6.52)	1 (2.17)	27 (58.70)	
Injury							
Sharp complete	0	0	0	0	0	0	<0.00001
Sharp incomplete	7 (15.22)	2 (4.35)	0	2 (4.35)	1 (2.17)	12 (20.09)	
Crush complete	0	0	0	0	1 (2.17)	1 (2.17)	
Crush incomplete	21 (45.66)	1 (2.17)	5 (10.87)	5 (10.87)	0	32 (69.57)	
Crush complete + incomplete	0	0	0	1 (2.17)	0	1 (2.17)	
Hand Dominance							
Dominant Hand	8 (17.39)	2 (4.35)	6 (13.04)	6 (13.04)	2 (4.35)	20 (43.48)	0.0026
Non-dominant Hand	20 (43.48)	1 (2.17)	2 (4.35)	2 (4.35)	0	26 (56.52)	

ρ values correspond to overall comparison of row variables (Age, Comorbidity, Injury, Hand Dominance) among Type of Management columns (Conservative, Primary Closure, Flap, Graft or Replantation). Values do not represent comparison of specific groups within each variable.

Complications were evaluated depending on the management instituted. Patients were assessed for infection, full or partial graft or flap loss, replantation loss or wound breakdown. Another complication reported by patients included decreased sensation in the injured finger. Nail growth was also taken into account as indicated in Table 5. Patient's comorbidities, namely smoking, were taken into consideration when analyzing complications (Table 6).

Table 5: Complications and nail growth in relation to different management strategies. Data is presented as n (%).

	Conservative	Primary Closure	Flap	Graft	Replantation/Revascularisation	Total	ρ Values
Complications Infection	3 (6.52)	1 (2.17)	1 (2.17)	1 (2.17)	1 (2.17)	7 (15.22)	0.0991
Partial Flap Loss	0	0	2 (4.35)	0	0	2 (4.35)	0.0001
Full Flap Loss	0	0	0	0	0	0	0
Partial Graft Loss	0	0	0	3 (6.52)	0	3 (6.52)	0.0002
Full Graft Loss	0	0	0	1 (2.17)	0	1 (2.17)	0.0293

Replant Loss	0	0	0	0	1 (2.17)	1 (2.17)	<0.00001
Wound Breakdown	0	0	1 (2.17)	1 (2.17)	0	2 (4.35)	0.0192
Decreased Sensation	1 (2.17)	0	0	1 (2.17)	0	2 (4.35)	0.1923
Nil	24 (52.17)	2 (4.35)	1 (2.17)	1 (2.17)	0	28 (60.87)	0.0035
Nail Growth							0.001
Normal	17 (36.96)	1 (2.17)	2 (4.35)	1 (2.17)	1 (2.17)	22 (47.83)	
Deformed	9 (19.57)	1 (2.17)	1 (2.17)	5 (10.87)	0	16 (34.78)	
No growth	2 (4.35)	1 (2.17)	2 (4.35)	1 (2.17)	1 (2.17)	7 (15.22)	
2nd surgery needed	0	0	0	1 (2.17)	0	1 (2.17)	

ρ values for Complications variable correspond to individual comparison of rows (Infection, Partial Flap Loss, Full Flap Loss, Partial Graft Loss, Full Graft Loss, Replant Loss, Wound Breakdown, Decreased Sensation) among Type of Management columns (Conservative, Primary Closure, Flap, Graft or Replantation).

ρ values for Nail Growth category correspond to overall comparison of rows (Normal, Deformed, No growth, 2nd surgery needed) among Type of Management columns (Conservative, Primary Closure, Flap, Graft or Replantation).

Table 6: Complications in relation to comorbidity. Data is presented as n (%).

	Infection	Partial Flap Loss	Full Flap Loss	Partial Graft Loss	Full Graft Loss	Replant Loss	Wound Breakdown	Decreased Sensation	Total	ρ values
Previous Injury	0	0	0	1 (5.56)	0	0	1 (5.56)	1 (5.56)	3 (16.67)	0.0253
Smoking	2 (5.11)	2 (5.11)	0	0	1 (5.56)	1 (5.56)	0	1 (5.56)	7 (38.89)	0.0242
No comorbidity	5 (10.87)	0	0	2 (5.11)	0	0	1 (5.56)	0	8 (44.44)	0.0598

ρ values for each variable correspond to individual comparison of rows (Previous Injury, Smoking, No comorbidity) among Complication columns (Infection, Partial Flap Loss, Full Flap Loss, Partial Graft Loss, Full Graft Loss, Replant Loss, Wound Breakdown, Decreased Sensation).

Functional Outcomes were measured according to range of movement, grip strength and time to return to work in relation to management instituted (Table 7). Hand therapy was utilized in less than a third of patients in the study (Figure 10). A comparison of results with and without hand therapy is presented in Table 8. Children and elderly were excluded when analyzing data regarding time to return to work and are included within the Not applicable category.

Table 7: Range of Movement, Grip Strength and Time to Return to Work in relation to different management strategies.

	Conservative	Primary Closure	Flap	Graft	Replantation/Revascularisation	Total	ρ value
Range of Movement							0.0013
Full	23 (50.00)	2 (4.35)	3 (6.52)	3 (6.52)	0	31 (67.39)	
Reduced	5 (10.87)	1 (2.17)	2 (4.35)	5 (10.87)	2 (4.35)	15 (32.61)	
Grip Strength							0.0084
Full	22 (47.83)	2 (4.35)	3 (6.52)	4 (8.70)	0	31 (67.39)	
Reduced	6 (13.04)	**1 (2.17)**	2 (4.35)	4 (8.70)	2 (4.35)	15 (32.61)	

Return to Work							
<1 month	7 (15.22)	0	0	1 (2.17)	0	8 (17.39)	
1 month	10 (21.74)	1 (2.17)	1 (2.17)	0	0	12 (26.09)	
2 months	3 (6.52)	0	1 (2.17)	4 (8.70)	0	8 (17.39)	0.0002
3 months	1 (2.17)	1 (2.17)	1 (2.17)	2 (4.35)	0	5 (10.87)	
>3 months	3 (6.52)	0	1 (2.17)	1 (2.17)	1 (2.17)	6 (13.04)	
Not applicable	4 (8.70)	1 (2.17)	1 (2.17)	0	1 (2.17)	7 (15.22)	

ρ values correspond to overall comparison of row variables (Range of Movement, Grip Strength and Return to Work) among Type of Management columns (Conservative, Primary Closure, Flap, Graft or Replantation). Values do not represent comparison of specific groups within each variable.

Table 8: Functional Outcomes in relation to Hand Therapy follow up. Data is presented as n (%).

	Hand Therapy	No Hand Therapy	Total	*p* value
Range of Movement				
Full	11 (23.91)	20 (43.48)	31 (67.39)	0.1178
Reduced	2 (4.35)	13 (28.26)	15 (32.61)	
Grip Strength				
Full	11 (23.91)	20 (43.48)	31 (67.39)	0.1178
Reduced	2 (4.35)	13 (28.26)	15 (32.61)	
Return to Work				
<1 month	3 (6.52)	5 (10.87)	8 (17.39)	
1 month	6 (13.04)	6 (13.04)	12 (26.09)	
2 months	2 (4.35)	7 (15.22)	9 (19.57)	0.2849
3 months	1 (2.17)	5 (10.87)	6 (13.04)	
>3 months	0	6 (13.04)	6 (13.04)	
Not applicable	1 (2.17)	4 (8.70)	5 (10.87)	

ρ values correspond to overall comparison of row variables (Range of Movement, Grip Strength and Return to Work) among Hand Therapy vs No Hand Therapy columns. Values do not represent comparison of specific groups within each variable.

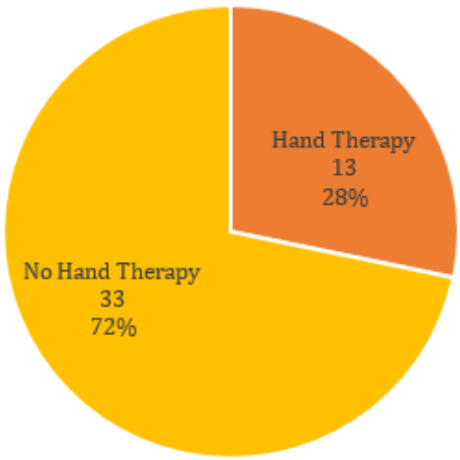

Figure 10: Use of Hand Therapy.

Discussion

Millions of people present annually to the Emergency Department with traumatic amputations of the upper limb [3]. The fingertip is the most commonly injured part of the hand. Kawaiah, et al. [4] reports that these injuries occur mostly in subjects aged less than 5 or over 65. However, Chang et al. [1] contradicts this stating that hand and digital injuries are mostly occupational accidents in manual labourers. Through this study we identified occupational injuries as the primary cause of finger amputation (n=28, 60.87%) in the local population.

We studied all soft tissue finger injuries with tissue loss, presenting to Plastic Surgery and Burns Unit at MDH between January and July 2021, resulting in a total of 46 patients. Incidence of soft tissue finger injuries was equal to 6.6 casualties per month. This data could be considered as the national incidence with MDH being the only main public hospital on the island. Digital amputation occurred largely on weekdays

(n=32, 69.57%) and in middle-aged men (n=39, 84.78%). The leading cause of work-related injury was found to be construction work (n=10, 35.71%). Most of the patients were not using protective wear (n=41, 89.13%) and this increases the need for stricter industrial health and safety regulations [5].

The commonest mechanism of injury involved crush incomplete amputation (n=33, 71.74%) in the nondominant hand (n=27, 58.70%). A possible explanation is that machine operation involves use of the dominant hand. This assumption is also described by [3]. The index finger was the commonest single digit injured (n=10, 21.74%). Multiple finger injuries were also prevalent (n=6, 13.04% in the non-dominant hand; n=4, 8.70% in the dominant hand). Most digits were injured from the tip of the finger to the base of the nail, Tamai 1 classification [4, 6].

The Tamai classification, that is widely used to classify finger amputations, divides the fingertip in two zones, Zone 1 being from the tip of the finger to the base of the nail and Zone 2 from the base of the nail to distal interphalangeal joint. Komatsu and Tamai carried out the first documented replantation of a completely amputated thumb at the level of metacarpophalangeal joint in a 28-year-old male in 1965 [7,8]. Replantation is a controversial method of managing finger injuries [9]. Previous studies from Western countries had a replantation rate of around 16% [10,11,12].

In our study, the overall attempt rate was 4.35% (n=2). This low number could be due to the fact that very few patients present to our unit with an amputated digit that fits the criteria for replantation. When opting for a replantation one has to consider many factors including patient factors, injury factors, and circumstantial factors such as time to presentation and availability of specialized care. Patient factors relate to patient's age and comorbidities, occupation, social factors, personal and cultural values. Injury factors denote the nature of injury, site and mechanism of injury and the number of digits involved [13]. Relative contraindications to replantation include advanced age, medical comorbidities and prolonged warm ischemia time leading to increased anaerobic metabolism, increased inflammatory response and cellular oedema [8]. In our sample, we had no immunocompromised patients. Revascularization was attempted in a fit healthy gentleman with thumb injury in the dominant hand. Replantation was performed in an even younger male with 5-digit injury of the non-dominant hand. The fingers were viable up to around 5 days and were lost when the patient needed vasoconstrictors in the intensive therapy unit, as a lifesaving manoeuvre. Cases favoring replantation include thumb injuries, injuries distal to flexor digitorum superficialis, multiple finger amputations and pediatric injuries [1].

In the local population, 28 patients (60.87%) were treated conservatively comprising the commonest treatment strategy of all modalities included in the study. First medical contact should provide antibiotics, analgesia, a clean antiseptic dressing, elevation and ATT/ATG booster (if indicated). This management was instituted in all patients included in the study and was sufficient enough for a successful outcome in 28 patients (60.87%). A low complication rate was observed. 3 patients (6.52%) suffering from infection and 1 patient (2.17%) had decreased sensation.

The other treatment options involve primary closure, local flap or skin graft. 16 of 46 patients (34.78%) were treated using these methods, with grafts being the most utilized option (n=8, 17.39%). Skin flaps and grafts are considered when primary closure does not achieve proper wound closure [8]. These reconstruction techniques have a higher risk of complications than conservative treatment. In fact, 12 of 16 patients (75%) reported a complication after primary closure, flap or graft. The complication rate in conservative treatment was much lower with 14.28% (4 of 28 patients). Smoking is related to a higher rate of complications ($p=0.0242$). Previous injury to same digit also increased risk of complications at a statistically significant level of $p=0.0253$.

In all cases, age, comorbidities, type of injury and hand dominance influenced the type of management and this relationship was statistically significant with $p < 0.05$ as seen in Table 4. Gender was not an influential factor on the type of management and p value was not statistically significant when compared to the type of management used as $p=0.1016$.

Nail growth was assessed in relation to the type of management and was found to be statistically significant with $p=0.0010$ indicating that nail growth is directly dependent on the type of management used. The majority of the patients who were treated conservatively had normal nail growth (n=17, 36.96%). Patients treated surgically with flap, graft or replant had a high incidence of deformed or no nail growth (n=12, 26.09%). One patient also required second surgery to nail after graft. This could be due to the fact that patients requiring conservative management only have more minor injuries when compared to those who need grafts or flaps. Management of nail injuries can be challenging, especially in relation to complex soft tissue finger injuries. All nailbed traumas should be analyzed in the context of underlying injuries and treated ideally in the first 24 hours [14].

Functional outcomes were assessed by studying range of movement, grip strength and time to return to work. All modalities of management had an acceptable functional outcome with statistically significant levels and $p<0.05$, implying that all three variables are powered by the type of management strategy chosen. Of note, time to return to work was longer in surgical intervention group (primary closure/flap/graft/replant) rather than the conservatively managed patients. This is most probably due to these patients having more severe injuries and thus needing surgery. Hand therapy was only utilized in a small proportion of patients (n=13, 28.26%) hence results obtained are not truly representative and did not reach a statistically significant level to prove the direct relationship between hand therapy and better functional outcomes. Sagiv, et al. [15] indicate that physical therapy programs should be designed and encouraged in every injury. In our study, the cohort who underwent hand therapy showed better results over the non-hand therapy group.

Conclusion

In summary, throughout this retrospective cohort study we have characterized the epidemiology of traumatic soft tissue finger amputations on a local level and identified the management strategies used. Descriptive analysis was performed regarding epidemiology, complications and functional outcomes. The importance of protective wear to limit occupational hand injuries and the adequacy of hand therapy to improve functional outcomes after traumatic soft tissue finger amputations were emphasized.

The study has some limitations namely a small single-centered sample, very limited use of replantation as a management strategy and limited data on follow up timeframe and surgeons' experience. Despite these limitations, we have provided a general background that sets ground for more focused research. Larger studies are required to represent better every management strategy, namely replantation, and limit bias as much as possible.

Traumatic soft tissue finger amputations present a devastating injury with functional, psychological and social implications. Incidence is high, in people of all ages, and injury often leaves a negative impact on any individual. Timely management and careful consideration in order to provide the best treatment and regain optimal function as soon as possible is essential in all cases.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

Reference

1. Chang DH, Ye SY, Chien LC, Ma H (2015) Epidemiology of digital amputation and replantation in Taiwan: A population-based study. Journal of the Chinese Medical Association 78(10): 597 602.
2. Sindhu K, Defroda SF, Harris AP, Gil JA (2017) Management of partial fingertip amputation in adults: Opertive and non-operative treatment. Injury 48(12): 2643-2649.
3. Pomares G, Coudane H, Dap F, Dautel G (2018) Epidemiology of traumatic upper limb amputations. Orthopaedics and Traumatology: Surgery & Research 104(2): 273-276.
4. Kawaiah A, Thakur M, Garg SP, Kawasmi SH, Hassan AM (2020) Fingertip injuries and amputaitons: A review of the literature. Cureus 12(5): e8291.
5. Davas Aksan A, Aika Durusoy, Emin Bal, Murat Kayalar, Sait Ada, et al (2012) Risk factors for the occupational hand injuries: relationship between agency and finger. American Journal of Industrial Medicine 55(5): 465-473.
6. Lemmon JA, Janis JE, Rohrich RJ (2008) Soft tissue injuries of the fingertip: methods of evaluation and treatment. An algorithmic approach. Plastic and Reconstructive Surgery 122(3): 105e-117e.
7. Tamai S (1982) Twenty years' experience of limb replantation - review of 293 extremity replants. Journal of Hand Surgery 7(6): 549-556.
8. Christoforou D, Alaia M, Craig-Scott S (2013) Microsurgical management of acute traumatic injuries of the hand and fingers. Bulletin of the Hospital for Joint Diseases 71(1): 6-16.
9. Scheker LR, Becker GW (2011) Distal finger replantation. The Journal of Hand Surgery 36: 521-528.
10. Gavrilova N, Harijan A, Schiro S, Hultman CS, Lee C (2010) Patterns of finger amputation and replantation in the setting of a rapidly growing immigrant population. Annals of Plastic Surgery 64(5): 534-536.
11. Mahmoudi E, Swaitek PR, Chung K C, Ayanian JZ (2016) Racial variation in treatment of traumatic finger/thumb amputation: A national comparative study of replantation and revision amputation. Plastic and Reconstructive Surgery 137(3): 576e-585e.
12. Shale CM, Tidwell JE, Mulligan RP, Jupiter DC, Mahabir RC (2013) A nationwide review of the treatment patterns of traumatic thumb amputations. Annals of Plastic Surgery 70(6): 647-651.
13. Pet MA, Ko JA (2019) Indications for replantaion and revascularisation in the hand. Hand Clinics 35(2): 119-130.
14. George A, Alexander R, Manju C (2017) Management of nailbed injuries associated with fingertip injuries. Indian Journal of Orthopaedics 51(6): 709-713.
15. Sagiv P, Shabat S, Mann M, Ashur H, Nyska M (2002) Rehabilitation process and functional results of patients with amputated fingers. Plastic and Reconstructive Surgery 110(2): 497 -503.