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Dr. Gurinderjit Singh Nagi
Associate Professor, Department of
Surgery, Punjab Institute of
Medical Sciences (PIMS) Garha
Road, Jalandhar City, Punjab,
India

Dr. Jangpreet Singh
Associate Professor, Department of
Surgery, Punjab Institute of
Medical Sciences (PIMS) Garha
Road, Jalandhar City, Punjab,
India

Fingertip injuries-surgical management and its outcome-original article

Dr. Gurinderjit Singh Nagi and Dr. Jangpreet Singh

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Abstract

Injuries to finger tips remain a very common type of injury and these injuries may result from industrial accidents or these may be house hold injuries. The injuries are small lacerations or amputations or may be nail bed injuries. There are various options for the management of these injuries but the treatment of choice is which results in best cosmetic and functional results. The various factors which dictate this depend upon the age of the patient, type of injury, physical needs and occupation of the patient and also on as to which hand is dominant.

Keywords: Crush injury, amputation, local flap, grafting

Introduction

Part of the terminal phalynx distal to the insertion of extensor and flexor tendons is called fingertip. The hand is prone to industrial and domestic trauma; and finger tips are quite frequently injured ^[1]. Significant morbidity results from the fingertip and nail bed injuries ^[2, 3]. Appropriate management of the fingertip injuries will result in good functions and cosmesis. Management of fingertip injuries is quite difficult because the treatment varies widely. The goal of management is to achieve good length, well-padded, sensate but painless skin. The various options in the management are based on individual needs considering the type of injury, age of the patient, dominance of hand and occupation etc. The study has been conducted to assess and analyse the injury type, various methods of management of fingertip injuries and the results thereof.

Materials and Methods:

This is a prospective study comprising 50 patients during the period 2017 and 2018. The injuries considered were of distal phalanx injuries distal to flexor and extensor tendon insertion. Various management/ reconstruction procedures were undertaken for the fingertip injuries. The patients presented in the emergency department and a detailed history of every patient was taken. History included the mechanism of injury, occupation of the patient, hand dominance and duration of injury. Patients demographics were also included in the history. Evaluation of injuries was done as regards the type of injury i.e. whether it is a sharp clean cut or crushed, nail bed injury or amputation and status of the remaining soft tissues. The patients were in the age range of 8 years to 56 years. Of the total of patients, 32 suffered fingertip injuries at work place, eleven suffered at homes and were females and seven were school going children who had door trap injury (Table 1). 27 patients had pulp injury/ lacerations, 15 patients had amputation and 8 had nail bed injuries (Table2). In 25 patients index finger was involved, 17 patients had ring/ middle finger injury while thumb was injured in 8 patients (Table 3). After due consideration of all factors and systemic evaluation of fingertip injuries and the status of remaining soft tissue, various options of their management were considered. The various options undertaken were i) grafting ii) local flaps iii) regional flaps and iv) Distant flap (littler flap). Grafting included split thickness skin graft in 6 patients, full thickness skin graft in 2 patients and composite graft in 4 patients of the local flaps volar V- Y advancement flap was done in 11 patients, lateral V-Y was done in 1 patient and Moeberg's flap (thumb) was done in 2 patients (Table 4). In regional flaps cross finger flap was done in 19 patients and Foucher's flap was done in 4 thumb injuries.

Corresponding Author:
Dr. Jangpreet Singh
Associate Professor, Department of
Surgery, Punjab Institute of
Medical Sciences (PIMS) Garha
Road, Jalandhar City, Punjab,
India

Table 1: Sex ratio/mode of injury

S. No.	Sex	Number of patients	Mode of injury	% age
1	Male	32	work place	64%
2	Female	11	House hold	22%
3	Children	07	Door trap	14%

Table 2: Type of injury

S. No.	Type	Number of patients	% age
1	Nail bed injury	08	16%
2	Pulp injury/Lacerations	27	54%
3	Amputation	15	30%

Table 3: Site of injury

S. No.	Site of injury	Number of patients	% age
1	Thumb	08	16%
2	Index finger	25	50%
3	Middle/ring finger	17	34%

Table 4: Reconstructive procedures done

S. No.	Procedure	Number of patients
1	Split-thickness skin graft	06
2	Full-thickness skin graft	02
3	Composite graft	04
4	Volar V-Y advancement flap	11
5	Lateral V-Y (Kutler) flap	01
6	Moeberg's flap (thumb)	02
7	Foucher's flap (Thumb)	04
8	Cross finger flap	19
9	Distant flap (Littler flap)	01
	Total patients	50

Results

The commonest injury in our study was pulp injury/laceration which was present in 27 patients out of 50 cases while 15 patients had amputation and 8 patients suffered nail bed injury. Average total period of treatment was two weeks and the patients were followed up for a period of two months. The maximum no of patients had index finger injured. Most of the injuries were suffered at work place. In this study, the results were very good as these injuries healed very satisfactorily and nicely as regards functional disability, finger length, cosmetic appearance, two point discrimination, hypersensitivity, pain, numbness and patient satisfaction (Table 5). The scar was inconspicuous in most of the patients. All the flaps healed satisfactorily except in two cases where marginal necrosis was observed and this was managed conservatively. 47 patients (94%) had good cosmetic appearance and 42 patients (84%) were fully satisfied with the outcome. After a follow up of eight weeks only two patients complaint of minor hypersensitivity. Two patients had wound dehiscence and two had marginal flap necrosis which was managed conservatively. None of the patients complained of pain after the follow up. Numbness was not significant. Two point discrimination scoring showed that Only 7 patients had 6mm or more, 27 patients had two point discrimination between 3 to 6mm and 16 patients had less than 3mm.

Table 5: Outcome

1	Cosmetic appearance	good in 47(94%) patients. 3 patients had flat pulp tip
2	Hypersensitivity	Initially 12 patients but after eight weeks only 2(4%) had hypersensitivity
3	Pain	None complained of pain after eight week follow up
4	Numbness	Not significant
5	Patient satisfaction	42(84%) were fully satisfied. Others had some minor complications
6	Complications	
	Wound dehiscence	02 patients
	Marginal flap necrosis	02 patients
	Infection	01 patients
	Joint stiffness	03 patients
7	Two point discrimination	
Scoring criteria	6mm or more	07 patients
	3 to 6mm	27 patients
	3mm or less	16 patients

Discussion

The fingertip injuries remain a very common type of hand injuries. Although they appear trivial but they can result in considerable functional disability if not managed timely and properly. The fingertip injuries can be classified in various ways and there are several classifications for fingertip injuries [4-7]. They may be classified according to the site of amputation and whether the injury involves pulp or nail bed and refer to zone and plane of injury [8, 9]. Zone I injury occur distal to the distal phalanx with preservation of majority of nail bed and matrix [10]. Zone II injuries are distal to lunular of nail bed there is exposure of distal phalanx and they require flap for reconstruction [8]. Zone III injuries involve nail matrix and there is loss of entire nail bed. Another system of classification PNB (pulp, nail, bone) classification has been proposed by Evans and Bernadis for fingertip injuries [11]. This system classifies fingertip injury into three areas i.e. pulp, nail and bone. The fingertip injuries can be managed in various ways. Every case is considered according to the type of injury and the needs of the patient. Distal arteries of fingers meet to distal to the distal insertion of flexor digitorum profundus to form the distal transverse volar digital arch and then branches into three or four arteries [12, 13]. In the process of arch formation, central pulp artery is located near distal phalanx and its location is deeper than lateral pulp artery [14, 15]. And Hyun Chul Park *et al.* classified fingertip injuries into four zones on the basis of three dimensional concept: zone I is damage to proximal central pulp artery, zone 2 is when damage is to the branch of central pulp artery, zone 3 is damage to distal central pulp artery and zone 4 is when injury is to only to lateral pulp artery and not to central pulp artery [16]. The treatment of fingertip injuries is really complex. The aim of treatment remains maximum functional length, prevention of contracture and good cosmetic outcome. The age, sex, occupation, finger involved, dominant hand, severity of injury as per classification and anatomy of the defect are various factors which need careful attention before starting management [8]. For simple lacerations when there is no skin loss, suturing can be done with monofilament suture. Wound however needs to be protected for six weeks [17].

Conclusion

Fingertip injuries are quite common and they demand timely and appropriate management which is really complex. Each case needs to be assessed carefully as regards the extent and type of injury. Aim should be to achieve good functional length and good cosmetic appearance. Split thickness skin graft should be preferred when wound is more than 1cm without exposure of tendon or bone. Consideration should be given to composite tip graft in children below seven/eight years of age.

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