

FINGER TIP INJURIES

(Merits of Different Surgical Reconstructions In Their Management)

*Dr. Debmalya Banerjee**

*Dr. Arun Kumar Ghosh***

*Dr. Subir Mukherjee****

The pulps of the fingers are super special part of the hand and are concerned with tactilegnosis and precision grips, a few of the functions for which human being is superior to others. Bunnell (1944) regarded the pulps of the fingers as the eyes of the hand.

Finger tip injuries are quite common form of hand injuries. Horne (1869) found an incidence of 675 finger tip trauma out of 2500 hand injuries he studied. Sharma (1970) found it to be 36 out of 72 cases.

Now-a-days various methods for repair of finger tip injuries are at hand. In the present study different types of repair of finger tip injuries have been evaluated.

Materials, Methods & Results

Finger tip injury cases either fresh or already treated, who attended Nilratan Sircar Medical College and Hospital, Calcutta during the period from November, 1977 to November, 1979 were studied. Altogether 80 such cases were recorded. During history taking emphasis was made to record the exact mechanism of injury, nature of injury and the profession of the patient.

A classification of finger tip injury based on Clarkson and Pelly (1962) and Tubians (1975) was followed.

A. Pulp injury without exposed phalanx

B. Pulp injury with exposed phalanx

C. Amputation-transverse or oblique.

D. Nail bed injury-either isolated or associated with other type of finger tip injuries.

Most of the patients were treated as day cases under local anaesthesia, except in situations where elaborate procedure and/or general anaesthesia was required, i. e., repair by neurovascular island flap.

Cases without exposed phalanx were mainly managed with free skin graft and conservative method, i. e., dressing only (Table 1). Eight cases were treated by partial thickness palmar skin graft. The doner area was selected from ulnar border and adjoining area of hypothenar eminence. In only one case the graft failed to take. Some flap covering was done in cases where phalanx was exposed (Table 1). Local pedicle

* M. S. (Cal). Asst. Professor & Incharge, Plastic Surgery Unit, N. R. S. Medical College & Hospital, Calcutta.

** M. S. (Cal), M. O., Deptt. of Surgery, Burdwan Medical College & Hospital, Burdwan. Formerly Post-graduate trainee, Plastic Surgery Unit, Deptt. of Surgery, N. R. S. Medical College & Hospital, Calcutta.

*** M. B. B. S. (Cal), Post-graduate Trainee, Plastic Surgery Unit, N. R. S. Medical College & Hospital, Calcutta.

Table I*Showing different methods of treatment adopted with number of cases treated.*

Type of Repair	No. of cases
Conservative method	10
Proximal amputation	8
Split thickness skin graft	10
Partial thickness palmar skin graft	8
Local pedicle flap (cross finger flap and thenar flap)	18 (9 in each type)
Distant pedicle flap	5
V-Y plasty	12
Neurovascular island flap	6
Others	3
Total:	80

flap (either cross finger flap or thenar flap) was done in most cases. Only 5 cases were treated by distant pedicle flap. Amputation type of injury was treated by V-Y plasty (12 cases). It include both bilateral and volar V-Y plasty. Neurovascular island flap was done in 6 cases. The island flap was taken either from adjacent finger or dorsilataral part of the injured finger.

The follow up period was variable in different types of repair ranging from 6 months to more than 2 years. Functional and cosmetic result was assessed in the follow up.

In this series males far outnumbered the females. Mostly young adults were affected. In analysing the cases it was found that right hand was affected in 60 percent of cases. Among the fingers, middle finger was involved in 35 percent of cases, index 28 percent, thumb and ring finger about 15 percent each.

The majority of the patients were unskilled labourers. Factory accidents caused 75 percent injuries and next to it was domestic accidents (about 20 percent).

Abstinence from the job is an important yardstick for the assessment of the functional result (Table II). It was observed that before 6 weeks only 20-25 percent of cases of V—Y plasty and skin grafting returned to work. By 8 weeks more than 50 percent of patients returned to work in all types except repair by local and distant pedicle flap. In distant pedicle flap repair, none returned to work by 10 weeks.

While evaluating the result of a particular type, patients' own assessment received due importance. Most of the patients treated conservatively complained of pain. The incidence of pain was significant (35 percent) in cases of free skin grafting also. Difficulty in tying shoes or buttoning clothes (Precision grip) was complained by about 75 percent cases of proximal amputation and distant pedicle flap repair. In other forms the incidence was less than 20 percent.

Wearing marks are the marks of staining, callosties, etc. on the finger and signifies the use of that finger at work (Bunnell 1944). Wearing marks were found in 2/3rd of cases of V—Y plasty, local pedicle and neurovascular island flap repair.

Table II
Showing the period of abstinence from job.

Types of Repair	Percentage of cases			
	Period off from job			
	6 weeks or less	8 weeks	10 weeks	More than 10 weeks
Conservative	10	50	40	—
Proximal amputation	—	100	—	—
Split skin grafting	20	60	20	—
Palmar skin grafting	25	50	25	—
Local pedicle flap	—	39	50	11
Distant pedicle flap	—	—	—	100
V-Y plasty	17	50	17	16
Neurovascular island flap	—	50	50	—
Total :	9	50	29	12

Cosmetic result was assessed by noting the contour of the finger tip, its colour and condition of the nail—whether deformed or not. Cosmetically repair by palmar skin grafting, thenar flap, V—Y plasty, and local neurovascular island flap achieved best results.

Tactilegnosis is the term attributed to superior sensory function of finger pulp. It was assessed on the basis of result of esthesiometry or tactometry, texture discrimination to sand papers (Sturman & Duran, 1963) and Weber's two point discrimination test. In tactometry the least weight of pin where patient could appreciate touch sensation was recorded. Normal value of tectometry in finger tip is 0.1 gm. weight on an average. Results upto 0.3 gm. wt. were grouped among good category. Texture discrimination to sand papers as proposed by Sturman and Duran (1963) is a variant of Seddon's Coin test. In this test the patient was asked to discriminate blind folded 3 different grades of sand papers. In two point discrimination test upto .6 mm value were grouped among

good results. On the basis of result of these tests cases of proximal amputation, V—Y plasty and neurovascular island flap repair showed good return of tactilegnosis (75 per cent or more in good category) (Table III).

Picking up test gives the ultimate functional result of a type of repair. Its result almost tallied with that of tactilegnosis, except in proximal amputation.

An idea of flexion contracture was made by simply measuring the distance, a fully extended finger lacks to touch the surface on which the dorsum of the hand was rested. It was insignificant in this series.

Discussion

Finger tip trauma is quite a common form of hand injury. The overwhelming importance of repair of trauma to this tiny part was stressed by hand surgeons for long, to name a few Moller et al (1961), Clarkson and Pelly (1962) Beasley (1977). Various types of repair were done considering the type of injury and profession of the patient to evaluate the methods in this set up.

Table III
Showing Return of tectilegnosis in different types of repair.

Methods of Repair	Percentage of cases		
	Good	Fair	Bad
Conservative method	30	10	60
Proximal amputation	75	25	—
Split skin grafting	30	60	10
Palmar skin grafting	38	62	—
Local pedicle flap	61	39	—
Distant pedicle flap	20	20	60
V-Y plasty	75	25	—
Neurovascular island flap	83	17	—

Young males were the victims in majority of cases. While analysing the causes of injury, a significant incidence of factory accident (75%) was noted in the present series. Metcalf and Whalen (1957) found 65%, Moller et al (1961) found 43% of finger injuries to be industrially caused as against 75% in the present series. Situation of our hospital in an industrial belt and lack of use of various safety devices in industry might be the factors.

In comparison to other series (Moller et al, 1961, Gottlieb et al, 1961, Freiberg and Manktelow, 1972), the patients in the discussion returned to work late. In reviewing the case records, impression was gained that protracted disablement time was frequently due to some other factor rather than the method of treatment or the type of injury. Many of our patients were reluctant to go back to work when clinically they had a sound repaired tip.

Subjective complaints are liable to great variations among different workers. Review of different series also shows that. Pain at the repaired tip was complained by many cases repaired by conservative method. Its

incidence was significantly less in tip injuries covered by flap, whether local or distant.

Inspectory findings are concerned mainly with cosmetic results except examination of wearing mark which is of great functional significance as stated by Bunnell (1944) and later Moberg (1958). Return of function is of prime importance but cosmetic result is by no means inferior. Even a manual worker was not indifferent to the appearance of a finger (Wilkie, 1956). Cosmetically repair by thenar flap, palmar skin grafting and V-Y plasty gave superior results. On studying the nail complication the impression was gained that the present method of management of nail bed injury was not satisfactory. Sacrificing an injured nail was not recommended as a tip without nail loose its support and moreover is ugly.

Various tests were performed for assessment of return of sensation. Of all the tests two point discrimination test is superior in measuring tactilegnosis (Bunnell, 1944; Moberg, 1958). In two point discrimination test excellent results were obtained upto 6mm discrimination value (Freiberg and Manktelow, 1972). Good tactilegnosis was present

in cases repaired by neurovascular island flap. V-Y plasty and proximal amputation.

Picking-up test outweighs others in the sense that it is the function rather than the sensation is tested. Though it is also subjective test, cheating is still difficult (Moberg, 1958). For this reason though tactilegnosis was present in proximal amputation cases, picking up test result was not good.

The criticism against thenar flap that it might end with contracture of I. P. Joints was not proved in the result.

Conclusion

From this small series with short follow-up it was found that while considering repair each case should be judged on its own merit. For injury with exposed bone any one of the

following methods, namely, neurovascular island flap repair, V-Y plasty and local pedicle flap could be considered. Local dorsilateral neurovascular island flap repair gave best result but it required meticulous dissection and in-patient treatment. V-Y plasty where applicable, i. e., in transverse or oblique dorsal amputation should be considered. Among the local pedicle flap, thenar flap was superior cosmetically. Though it took a longer time for repair, the operative procedure was simple.

For injury without exposed bone partial thickness palmar skin graft gave best results. Conservative method had the limitation that it might end in a painful tip.

Repair of nail bed injury was not satisfactory.

References

- Beasley, R. W. : Principles and technique of resurfacing operation for hand surgery. *Surg. Clin. North Am.*, 47 : 389, 1967.
- Bunnell. S. : *Surgery of the Hand*, J. B. Lippincot Co., 1st edition, 1944.
- Clarkson, P. and Pelly, A. : *The General and Plastic Surgery of the Hand*. Oxford. Blackwell Scientific, 1962.
- Freiberg, A. and Manktelow, R. : The Kutler repair of finger tip amputation. *Plast. Reconstr. Surg.*, 50 : 371, 1972.
- Gottlieb, O. and Mathiesen, F. R. : Thenar flaps and cross finger flaps, *Acta Chir. Scand.*, 122 : 166, 1961.
- Horner, R. L. : Finger tip trauma. *Surg. Clin. North Am.*, 49 : 1373, 1969.
- Joshi, B. B. : A local dorsolateral island flap for restoration of sensation after avulsion injury of finger tip pulp. *Plast. Reconstr. Surg.*, 54 : 175, 1974.
- Littler, J. W. : Neurovascular pedicle method of digital transposition for reconstruction of the thumb. *Plast. Reconstr. Surg.*, 12 : 303, 1953.
- Metcalf. W. and Whalen, W. : The surgical, social and economical aspects of unit hand injury. *J. Bone Joint Surg.*, 39A : 317, 1957.
- Moberg, E. : The objective method for determining the functional cealuc of sensibility in the hand. *J. Bone Joint Surg.*, 40B : 459, 1958.

- Moberg, E. : Aspects of sensation in reconstructive surgery of the upper extremity. *J. Bone Joint Surg.*, 46A : 817, 1964.
- Moller, J. B., Pers, M. and Schmidt, A. : Finger tip injury-Late results. *Acta Chir. Scand.*, 122 : 177, 1961.
- Sharma, L. K. : The transaction of the 1st Asian Pacific Congress of Plastic Surgery, New Delhi, 1 : 164, 1970.
- Sturman, M. J. and Duran, R. J. : Late results finger tip injury, *J. Bone Joint Surg.*, 45A : 289, 1963.
- Wilkie, R. : A social and occupational study of injured hands. *Brit. J. Indust. Med.*, 13 : 119, 1956.
-