

RECONSTRUCTION OF THE THUMB (Study of 100 Cases)

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INTRODUCTION

The paper is based on a study of 100 cases of traumatic thumb loss which needed some form of thumb reconstruction.

In humans the cardinal function of the hand is the pinch and grasp, in which the thumb plays a most important part, hence loss of the thumb imposes a critical disability by depriving the hand of refined pinch and firm grasp. It is said that a hand without a thumb is at best, a useful hook.

It is therefore quite rightly ascertained that when the thumb is amputated at the level of metacarpophalangeal joint, the compensation payable is equal to loss of 40% of the whole hand or even more in a skilled craftsman.

PRINCIPLES OF MANAGEMENT

In carrying out an operation for reconstructing the thumb one must keep in mind following principles of management.

- (1) Always fit the patient for the operation.
- (2) The level of the amputation, functional and residual value of the stump and anatomical and functional state of the remaining digits play an important part in determining the type of reconstruction.

- (3) Occupational needs of the patient is of vital consideration.
- (4) Age of the patient should be considered in evaluating the particular method of reconstruction.
- (5) Ultimately good appearance and good function go together and should be the Surgeon's aim.

REQUIREMENTS OF AN IDEAL THUMB

"Sensibility and movement is to the hand what vision is to the eye"

"When you have nothing, A little is a lot"

(Bunnell, 1970)

- (1) Length: the ideal length for the reconstructed thumb is such that it reaches almost to the junction of the middle and distal thirds of the proximal phalanx of the adjacent index finger.
- (2) Sensation: Sensation is important since if it is absent or decreased, the newly reconstructed thumb is excluded from the hand's precision activities. Far more disabling than insensitivity is hypersensitivity, because then the patient will just not use his thumb.
- (3) Strength: Strength is vital for firm grip or pinch. Active metacarpophal-

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lanceal flexion—adduction provides the power for pinch and the metacarpal muscles provide strength.

- (4) Stability: To have strength, the joints in the thumb must be stable and the carpometacarpal joint is the foundation for stability.
- (5) Mobility: A reconstructed thumb must have at least opposition movement.
- (6) Position: Palmar abduction and pronation (Abductor pollicis brevis) of metacarpophalangeal unit brings the thumb into the optimum preparatory functional position.

Useful thumb position and stability can be gained through a basal joint fusion, but power and movement can be gained only through appropriate muscle tension.

INCIDENCES

The average age of the patients was 26.8 years. The youngest patient was 1½ years and the oldest 69 years old. The ratio of male patients to female patients was 91.9. The significant difference is due to high level of manual employment in males.

Etiologically 68 patients had industrial accidents, 28 patients had domestic accidents while in only 4 patients was a road traffic accident the cause of thumb injury. The larger incidence of injuries caused in industry is as to be expected in a industrialized city like Bombay. The ratio of right side to left side affected was 58 to 38, while there was bilateral involvement in 4 patients. In 80 cases only thumb was involved while in 20 cases thumb was injured along with other digits.

PARTIAL THUMB RECONSTRUCTION

The various methods used by us for partial thumb reconstruction (87 cases) were as follows:

Table —I

(A) TIP LOSS (Cases 62)	No. of Cases
1. Suturing	9
2. Free Graft	
Split skin graft	22
Full thick graft from amputated digits	6
3. V. Y. Plasty	18
4. Cross-Finger Flaps	3
5. Artery Island Flaps	4
 (B) SUBSTANTIAL PARTIAL LOSS (Cases 25)	
1. Abdominal Flap	13
2. Pectoral Flap	9
3. Groin Flap	3

(A) TIP REPAIRS

1. *Suturing*:

Out of 9 patients, 8 patients healed with excellent primary healing and returned to their jobs or routine activity on an average of 15 days after the injury. Except one patient healed with secondary healing who returned to work on 23rd postoperative day.

2. *Free Graft*:

Split skin grafts were taken either from lateral aspect of thigh or anterior aspect of forearm. Out of 22 patients, 16 patients healed primarily, in 6 patients there was some degree of skin loss. On an average patient returned to their job and routine activity 21 days after injury.

Full thickness skin graft using the amputated remnant was done in 6 patients with good take of graft.

3. V. Y. Plasty :

We have used V-Y plasty—Kleinert method for tip loss with gratifying results. We have not used the Kutler method because the scar lies on the tip and this may impair the function of the thumb tip by painful scar or neuroma formation.

Out of 18 patients, 16 patients healed primarily and returned to their job or routine activity by 17 days. 2 patients had partial loss of flap, which healed with secondary intention with minimal loss of sensations.

The V. Y. Plasty results are superior to free grafts because it provides good sensations, stereognosis, protect underlying bone, give good padding and patient can be sent to his job earlier.

4. Cross-Finger Flap :

In 3 patients we did cross finger flap with good results, but return to normal job activity was delayed till 32 days.

5. Artery Island Flap :

This was done in all four cases as a secondary procedure (Fig. 1, 2). Excellent results as far as all sensory features were noted in all cases of artery island flap.

(B) SUBSTANTIAL PARTIAL LOSS :

1. Abdominal Flap (Fig. 3, 4)

13 cases were treated by abdominal flap. Whenever we need a larger area for cover, we prefer the abdominal flap or tube pedicle as it is from the most hidden donor site and the

hand lies in a comparatively more comfortable position.

2. Pectoral Flap :

9 cases were treated by pectoral flap or tube pedicle. Whenever we need a smaller area for cover, we prefer the pectoral flap or pectoral tube pedicle because it has a better colour match and less hair distribution than other areas.

3. Groin Flap :

3 cases were treated by groin flap or tube pedicle. We prefer the groin flap for female patients because the scar can be hidden beneath the clothes (saree).

There was no appreciable difference in results when patients were treated by any of above methods for substantial partial loss of the thumb. Out of 25 patients, results in 20 were satisfactory and primary healing was achieved. In 3 patients there was dehiscence of the wound and in 2 patients there was partial necrosis of flap. Patients returned to their job or routine activity on an average of 48 days after injury.

The major drawbacks of these procedures are bulkiness of flap, prolonged immobilization and prolonged hospitalization.

TOTAL THUMB RECONSTRUCTION :

The various methods used by us for total thumb reconstruction (13 cases) were as follows :

Table-II

	No. of cases
1. Finger Transposition	6
2. Osteoplastic Flap	4
3. Rearrangement of Hand Remnants	3

1. *Finger Transposition (Fig. 5, 6):*

We have carried out finger transposition of the index finger in 6 patients with extremely gratifying results. As an operation, it is technically the most difficult but the procedure tempts the surgeons by its elegance of concept and the near natural appearance of the reconstructed thumb.

Although there is supposed to be weakening of the power grip, we have neither found it to be of special significance nor have any of our patients complained about it. The restoration of sensations and movements to such an extent as to permit even precision work to be done, together with the most socially accepted hand far outweighs the few drawbacks. In a case where the transposed digit was a little longer, it led to a less pleasing appearance though function-wise it was a perfect thumb.

2. *Osteoplastic Flap:*

We have used osteoplastic flap in 4 cases. This method was used on various conditions, such as the presence of metacarpal with intact thenar muscles and on the age, occupation and inclination of the patient. For the bony component we have always used the iliac bone.

The new thumb had to be of necessity in two cases, a fixed post and had to be placed in the plane of action of the fingers with only pinch restored. The disadvantage of this method was obvious. In another case, there was atrophy of bone from disuse, as the position was not good. The hand was consequently not used as much as it should have been.

3. *Rearrangement of Hand Remnants (Fig. 7, 8):*

The simple method, viz.: rearrangement of hand remnants was carried out in 3 cases when there was gross deformity with absence of digits.

FOLLOW UP:

The patients come for follow up twice in a week immediately after the injury till their wounds are completely healed. Then they follow up every month for 2 months and then after 3 months. If necessary, patients are referred to physiotherapy and occupational therapy for exercises and splint.

We specifically look for appearance, function, (pinch, grip and opposition) sensibility, usability of hand and whether patient has resumed the same type of work or not.

CONCLUSION:

If patient comes with tip loss, we prefer V. Y. Plasty or Free graft. V. Y. Plasty is done when sufficient amount of pulp tissue is present, which can be advanced to close distal defect. If it is not possible to cover the defect with V. Y. Plasty, only then we do free graft with preference for a full thickness graft from the amputated tip.

For total thumb loss, we prefer finger transposition over other two methods because of excellent functional and esthetic results, together with minimum hospitalization and rehabilitation.

SUMMARY:

We have evaluated 100 cases with particular emphasis on tip losses and total thumb loss.

Various methods and follow up of partial thumb reconstruction and total thumb reconstruction are discussed.

If necessary patients are referred to physiotherapy and occupational therapy.

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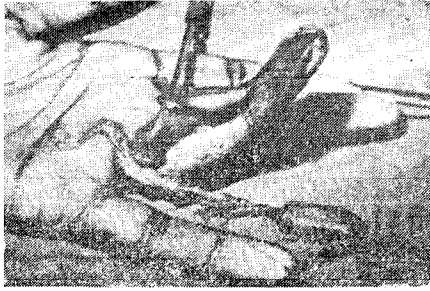


Fig. 1. Artery Island Flap with neurovascular bundle.

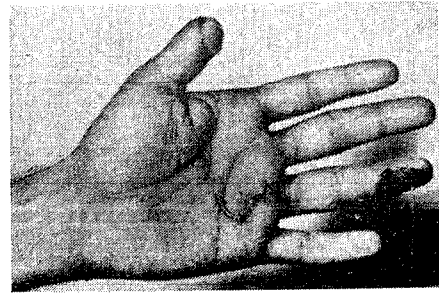


Fig. 2. Artery Island Flap Post-operative.

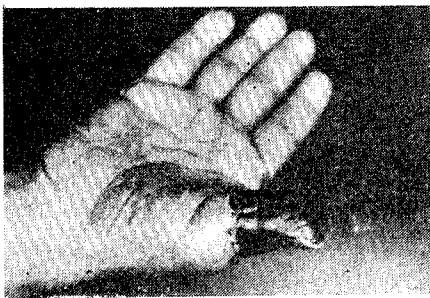


Fig. 3. Pre-operative—Gangrenous thumb.

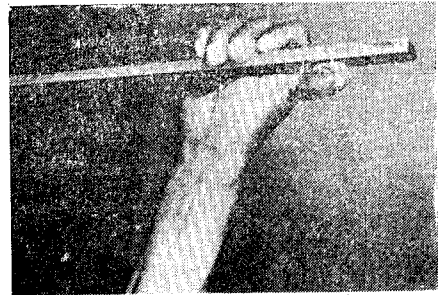


Fig. 4. Post-operative holding wood—Reconstructed with abdominal flap.

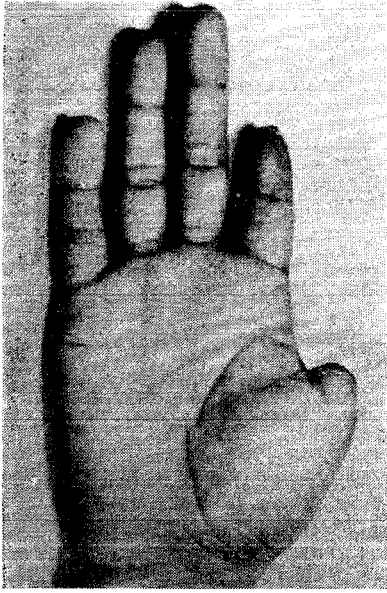


Fig. 5. Pre-operative Total thumb loss.



Fig. 6. Post-operative-Following index finger transposition.

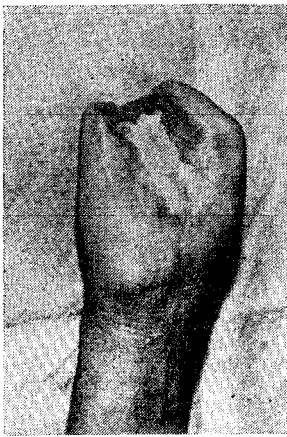


Fig. 7. Pre-operative-Grossly deformed hand with absence of all digits.



Fig. 8. Post-operative Following metacarpal phalangization.

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