

Osteo-Plastic Re-Construction of a Traumatized Thumb

Anjan Biswas*

Orthopedic Specialist, United Arab Emirates

*Corresponding Author: Anjan Biswas, Orthopedic Specialist, United Arab Emirates.

Received: June 14, 2019; Published: August 13, 2019

Abstract

A 25 years old male construction worker was received in accident and emergency with completely traumatized left thumb. Osteoplastic reconstruction without neurovascular island graft was performed. At 3 months, the iliac bone and the pedicle skin graft both were found healed fully. At 6 months period, his functional ability to pinch and grip were found satisfactory. Osteoplastic reconstruction is comparatively easier method of thumb reconstruction, but specific post traumatic requirement needs to be taken into consideration while selecting the procedure.

Keywords: Thumb; Traumatic Injury; Debridement; Osteo-Plastic; Iliac Bone; Pedicle Skin Graft; Neuro-Vascular; Grip; Pinch

Introduction

The thumb contributes a major role in hand function. Grip, pinch, grasp and fine handling are some of the important tasks of a normal thumb during the activities of daily living. The absence of thumb account for 40% loss of functional prehensile ability of a hand. Thus, traumatic injury to the thumb produces a more significant loss than would result from loss of any other fingers. Great effort, therefore, has been taken up for reconstruction of an injured thumb. Lot of procedures have been described including, osteoplastic reconstruction, metacarpal lengthening, phalangization, pollicization and toe-to-hand transfer. Each patient's needs and expectations are to be taken into consideration while selecting the type of procedure.

In 1874 Huguier first reported "phalangization" of the thumb metacarpal by deepening the first web space (Huguier 1874). Thereafter Nicoladoni described a staged, pedicled great toe-to-thumb transfer to reconstruct an amputated thumb (Nicoladoni 1900). Microsurgical toe-to-thumb transfer was first tried successfully in monkeys in 1965 (Buncke 1966) and in a human in 1966 (Cobbett 1969). Index finger pollicization for thumb reconstruction was first reported in 1971 (Buck-Gramcko 1971).

Materials and Methods

A 25 years old man from Nepal, injured his left hand when a heavy object fell from height, while working in a building construction site. He was immediately brought to our Emergency room. We found him having sustained a completely crushed left thumb up to the level of Metacarpo-Phalangeal joint. The skin and bones were found fully devitalized and beyond the scope of any repair (Figure 1).

He was booked for operation for Re-construction of the injured thumb.

Operative procedure: Re-construction of the thumb using iliac crest bone and pedicle skin grafting.

- 1) Through cleaning and debridement of all devitalized tissues was performed up to the level of M.P joint of the thumb. The head of the 1st metacarpal was found intact and the skin at this level too was found healthy (Figure 1).
- 2) The head of 1st metacarpal was nebulled flat removing the cartilage covering.
- 3) A bone graft of size 3.5 X 2 cms was taken out from the left iliac crest and given the required shape like a phalange (Figure 2).
- 4) The bone graft now placed on the prepared head of the 1st metacarpal and fixed with a 1.6 mm Kirchners wire giving a 10-degree flexion and rotation effect to make it functionally more useful. Some small pieces of cancellous bones are now kept around the junction of the two bones (Figure 3).
- 5) The lower part of the abdomen is now prepared, and a pedicle skin graft is fashioned out and the tube-skin is now clothed over the bone graft and stitched at the base with the original skin of the thumb.



Figure 1

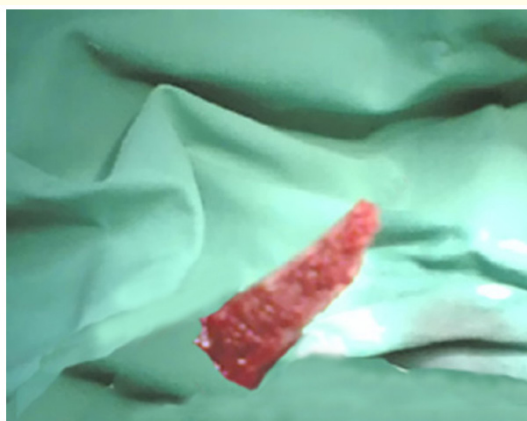


Figure 2



Figure 3

The skin gap on the abdomen was closed by approximation of the skin. Adequate support was provided to the hand with the abdomen, so that the pedicle graft suturing remained protected (Figure 4).

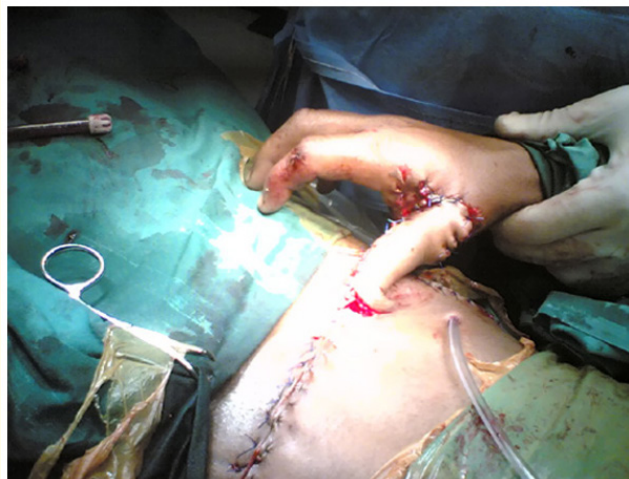


Figure 4

Post-operative procedure

- 1) The abdominal pedicle skin graft remained stitched with the thumb skin for a period of 3 weeks.
- 2) After 3 weeks, the pedicle skin was detached from the abdomen. Adequate vascularisation was detected in the newly constructed thumb skin. The skin at the tip of the thumb now sutured (Figure 5).



Figure 5

Results

The re-constructed thumb was reviewed in out-patient clinic after 2-weeks and 4-weeks intervals. The skin was found healed and the bone graft was in the uniting stage.

At 3-month period, the skin scar was almost disappeared, and the bone graft was united fully (Figure 6 and 7).

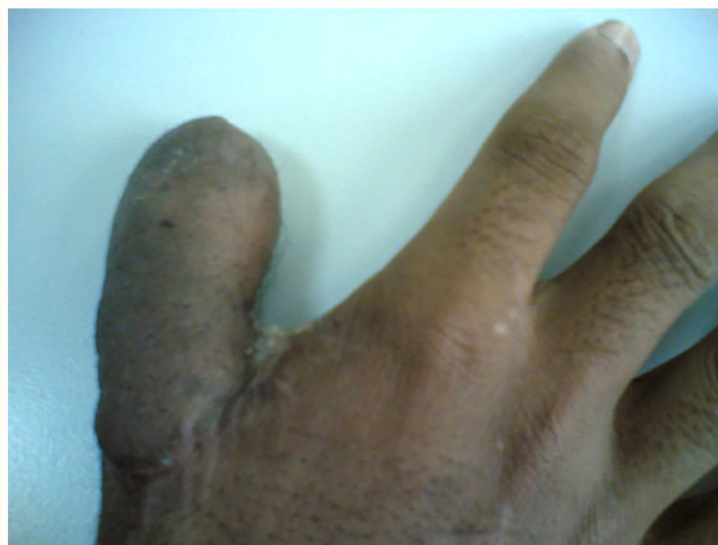


Figure 6



Figure 7

The functional status of the thumb was found satisfactory. The patient was found to have achieved the ability to hold an object with a satisfactory grip (Figure 8). We again followed him up in OPD after 6-month (Figure 9).



Figure 8

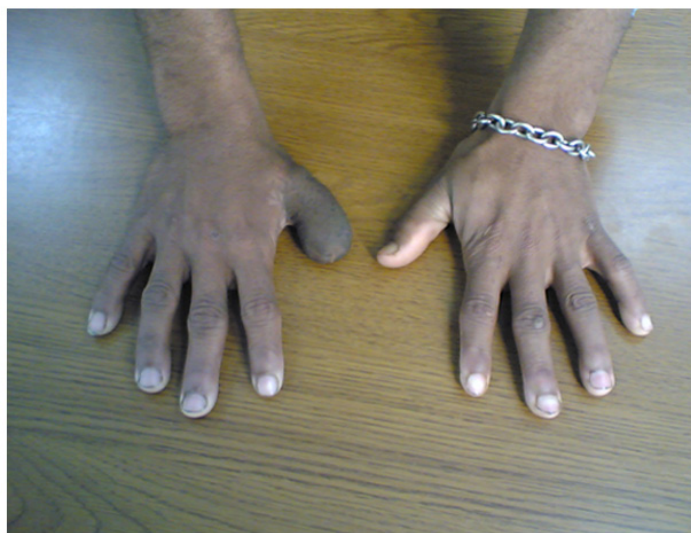


Figure 9

Discussion and Conclusion

Re-construction of thumb using iliac crest bone is relatively easier than other methods of thumb reconstruction, which are technically more demanding. Since, there is no sensation over the new skin of the thumb, in osteo-plastic reconstruction, transfer of a neurovascular island graft from an adjacent finger to the volar aspect of the thumb is necessary to improve the sensation in the new thumb. If this is not included in the initial reconstruction, then this transfer can also be performed at a later period.

The reconstruction of an injured thumb is both challenging and rewarding for a hand surgeon, because of the high value of a functioning thumb to a hand. Among the various reconstructive methods the best results are obtained with re-implantation or revascularization [1]. Buncke reported the survival rate for these transfers as high as 98%, with 2-point discrimination of 8 mm or less in 80% of cases, and grip strength for a reconstructed dominant thumb at 80% of that of the non-injured hand [2]. However, while selecting the procedure, the patient's profession, and the specific post-traumatic requirement have to be taken into consideration. A detailed discussion with the patient is helpful in this regard [3-14].

Bibliography

1. Samir M Kumta. "Unfavorable results in Thumb reconstruction". *Indian Journal of Plastic Surgery* 46.2 (2013): 294-302.
2. Gregory M Buncke., *et al.* "Great Toe-to-Thumb Microvascular Transplantation After Traumatic Amputation". *Hand Clinics* 23.1 (2007): 105-115.
3. Pet Mitchell AMD., *et al.* "Reconstruction of the Traumatized Thumb". *Plastic and Reconstructive Surgery* 134.6 (2014): 1235-1245.
4. Broadbent TR and Woolf RM. "Thumb reconstruction with contiguous skin-bone pedicle graft". *Plastic and Reconstructive Surgery* 26.5 (1960): 494-499.
5. Littler JW. "On making a thumb: one hundred years of surgical effort". *Journal of Hand Surgery-American Volume* 1.1 (1976): 35-51.
6. Bunnell S. "Reconstruction of the thumb". *American Journal of Surgery* 95.2 (1958): 168-172.

7. De Oliveira JC. "Some aspect of thumb reconstruction". *British Journal of Surgery* 57.2 (1970): 85-89.
8. Lewin ML. "Sensory Island flap in osteoplastic reconstruction of the thumb". *American Journal of Surgery* 109 (1965): 227-229.
9. Foucher G and Khouri RK. "Digital reconstruction with island flaps". *Clinics in Plastic Surgery* 24.1 (1997): 1-32.
10. Kleinman WB and Strickland JW. "Thumb reconstruction". In: Green DP, ed. *Operative Hand Surgery*. 2nd edition. New York, NY: Churchill Livingstone (1999): 2068-2170.
11. Lister G. "The choice of procedure following thumb amputation". *Clinical Orthopaedics* 195 (1985): 45-51.
12. Littler JW. "Reconstruction of the thumb in traumatic loss". In: Converse JM, ed. *Reconstructive Plastic Surgery*. 2nd edition. Philadelphia, PA: WB Saunders Co (1977).
13. Morrison WA. "Thumb reconstruction: a review and philosophy of management". *Journal of Hand Surgery British Volume* 17.4 (1992): 383-390.
14. Shin AY, *et al.* "Microvascular reconstruction of the traumatized thumb". *Hand Clinics* 15.2 (1999): 347-371.

Volume 10 Issue 9 September 2019

©All rights reserved by Anjan Biswas.