

Case Report

Osteoplastic Reconstruction of the Thumb: a case report

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ABSTRACT

Background & Objectives: Thumb accounts for 50% of the hand function. Amputation of the thumb severely jeopardises the hand function. Thumb replantation, toe transfer are the ideal methods for restoring the hand function, but is not always possible owing to type of injury, time to presentation, surgical skill and set up. Osteoplastic thumb reconstruction for amputation

around the metacarpophalangeal joint is a good treatment option to restore the hand in a developing setup.

Presentation of Case: A 25yrs male with amputation of thumb around metacarpophalangeal joint with delayed presentation and crushing component of distal part underwent multiple staged osteoplastic reconstruction of the thumb. The procedures consisted of bony structure fixation with bone graft followed by coverage with a thinned tubed groin flap which was divided at 2 weeks interval. The thumb was made sensate with sensate flap (first dorsal metacarpal artery flap).

Discussion: Thumb replantation is ideal in acute setup in a clean traumatic amputation, while toe transfer is ideal in a delayed setup with healed wound. This requires a good operating room set up with microsurgical set up and skilled manpower, which is difficult in a developing country. Osteoplastic reconstruction requires multiple staged procedures that can be done at a primary level setup.

Conclusion: Osteoplastic thumb reconstruction is a good option for amputation around the metacarpophalangeal joint to restore hand function in a resource limited set up.

Keywords: Hand function, Osteoplastic thumb, Sensation, Toe transfer, Thumb amputation, Tubed groin flap.

INTRODUCTION

Thumb is the most important digit of the hand. It is responsible for performing 50% of hand function. Thumb replantation is the treatment of choice for thumb amputation but is not always possible due to technical challenges, type of injury (crush, segmental, mutilated), timing of presentation and part preservation. Features of a good thumb are i) adequate length ii) sensibility iii) stability iv) strength v) mobility (opposition) vi) position vii) aesthetic value [1]. Replantation and toe transfer are a high yield surgery requiring highly skilled manpower and instruments, which is not always possible in developing countries like Nepal. A number of non-microsurgical techniques for thumb reconstruction are available like soft tissue reconstruction, flap coverage, web space deepening, distraction osteogenesis, osteoplastic reconstruction (single staged/multiple staged), pollicization of remaining finger depending upon the length of available tissue, type of injury. Osteoplastic reconstruction was first attempted by Nicoladoni in 1897 by covering a bone graft with a pedicled flap [2]. Though inferior in cosmesis and requiring a longer time, it can still be viewed as a viable option for amputation around MCP joint, when people are reluctant to lose a toe or there is technical inadequacy for microsurgical reconstruction [3]. Sabapathy has also described staged techniques of thumb reconstruction in an amputation around carpometacarpal joint, where the amputated part is initially managed with soft tissue coverage using groin flap/skin graft. This is later followed by a toe transfer followed by physiotherapy [4].

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We present a case of non replantable thumb amputation around MCP joint due to injury by a wood cutting saw in a 25 yrs male using the bone from the amputated part.

CASE REPORT

Surgical technique

First stage: Debridement of the ends, extraction of phalanges from the amputated part and fixation with Kwire to the proximal stump. Soft tissue coverage using a tubed pedicled thinned groin flap.



Fig 1: A, B) Amputated thumb C) Bone grafting followed by tubed groin flap coverage

Second stage: Groin flap was clamped from 3rd day onwards at regular intervals of 2 hours for 5min and gradually increasing the clamping time from 5 min to 35 min. this was continued for 2 weeks.

Chaurasia, LR et al.,

Groin flap was divided and inseting was done at 2 weeks interval.



Fig 2: Goin flap after division & inseting

Third stage: (3 months after flap division): Neurovascular island flap (First dorsal metacarpal artery flap pedicled with radial nerve for restoring sensation) inseting done after excision of the contact surface of the thumb. Flap was monitored regularly and a final follow up was made at 8 months.

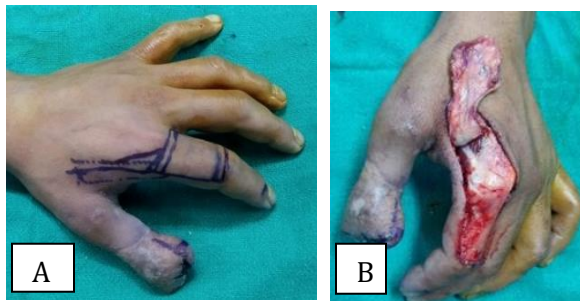


Fig 3: A) FDMA flap marking B) Flap elevation C) After inseting

The patient was evaluated for length gain, thumb opposition using Kapandji's opposition score, aesthetic value using Likert's scale. The thumb sensation was evaluated over flap and FDMA flap area using aesthesiometer and compared to normal thumb. The patient had good finger pinch and were able to pick small objects. They initially had cortical misinterpretation of the thumb that was gradually relearned with physiotherapy over a period of 8 months. The patient was able to use his thumb in normal day to day activities and patient was satisfied with the outcome. There was a length gain by 3.4 cm. Total stay in hospital was 17 days.

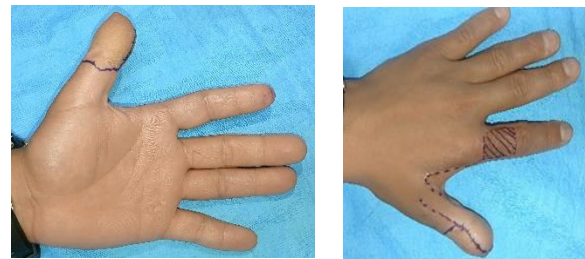


Fig 4: Final clinical picture and results

Length gain: 3.4cm
Kapandji thumb opposition score: 6
Aesthetic appearance (Likert's scale): 4
2PD flap area: 13mm
2PD FDMA flap: 12mm
2PD normal thumb: 6mm

DISCUSSION

Microsurgical reconstruction with second-toe transfer, great toe transfer, or wraparound technique gives better result, both functionally and cosmetically [5]. Osteoplastic thumb reconstruction is indicated for amputation around metacarpophalangeal joint when replantation or toe transfer is not feasible due to technical difficulties or patients reluctance to sacrifice a toe. Though nailed grafting was attempted in this case

but failed to uptake. Hyperpigmentation of the flap is a major concern by the patient. A heterodigital flap from ring finger or long finger can also be used to improve sensation of the thumb (2PD). Radial artery forearm osteocutaneous flap and littler flap can be used to decrease the staging of reconstruction.

CONCLUSION

Osteoplastic reconstruction is a good option for thumb reconstruction in absence of expertise or non-feasibility. Further studies including a large number of cases is required to validate the results of the technique.

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