Pedicled On-Top Plasty for Thumb Reconstruction: Utilization of Proximal Phalanx of an Injured Ring Finger

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ABSTRACT
Thumb has a critical role in the hand function. It is the most important digit for pinching and grasping. Therefore, thumb amputation demands its replantation or reconstruction to restore the hand functions. A case of hand injury which involved multiple digits along with amputation of thumb is reported. The thumb had amputation level just distal to Metacarpophalangeal joint (MPj) along with amputation of other 3 fingers at different levels. Proximal phalanx of ring finger based on palmar vessels was utilized for on-top plasty to build thumb post and restore hand function. On-top plasty for thumb is quite useful, dependable, easier, time saving option which does not increase the morbidity associated with other options of thumb reconstruction. It may especially be a very useful option for the centres lacking the facility and equipment for micro-vascular surgeries and expertise of the trained micro-vascular surgeons.

Key Words: Thumb reconstruction. Pedicled on-top plasty. Mutilating hand injuries.

INTRODUCTION
Thumb is the most important digit of the hand. The prime motor functions of hand like holding an object or forming any grip, precision or power, involve curling of the finger/fingers against the thumb. So loss of thumb will result in loss of this post against which rest of the fingers oppose to carry out most of the functions. It is, therefore, necessary to make every effort to replant or reconstruct the amputated thumb to regain its functions. Replantation of the amputated thumb is considered the best management for the proximal amputations. Reconstruction of thumb may involve phalangization of the metacarpal bone, distraction osteogenesis, pollicization of index stump or finger.

Other various options utilize various regional and distant flaps for osteoplastic reconstruction of the lost thumb. Free toe-to-thumb transfer is also very useful option which needs sophisticated operating facilities, equipment, and expertise of surgeon. However, it does have the disadvantage of sacrificing normal toe, an option which may not be acceptable to many of the patients. On-top plasty utilizes the other damaged or amputated digits to lengthen a partial or distal subtotal thumb amputation.

Present case report discusses the experience of pedicled on-top plasty for reconstruction of the amputated thumb along with literature review.

CASE REPORT
A 42-year book-binder accidentally cut his left thumb, index and middle fingers at the level of Metacarpophalangeal joints (MCPj), and ring finger at level of Proximal Interphalangeal joint (PIPj) [Figure 1]. Thumb stump had intact MPj with a few mm bone stump of the proximal phalanx remaining at stump. Stump at ring finger consisted of proximal phalanx with a transverse cut through its distal part also creating a skin loss of the radial side of the proximal phalanx. Thumb stump had intact MPj with a few mm bone stump of the proximal phalanx remaining at stump. Stump at ring finger consisted of proximal phalanx with a transverse cut through its distal part also creating a skin loss of the radial side of the proximal phalanx at ring finger. He refused toe-to-thumb transfer and stump at ring finger was planned to be utilized to reconstruct the missing length of the thumb. It was skeletonized on palmar neurovascular bundle. The dorsal metacarpal artery was divided. The transferred stump was immobilized on the top of thumb stump with the help of k-wire for 4 weeks. The soft tissue defect at the most distal part of this reconstructed thumb was covered with skin graft. Figure 2 shows this thumb having restored its full length along with good apposition with the little finger.

DISCUSSION
On-top plasty was first described by Kelleher et al. in 1968 and it utilized amputation stumps of various digits.
for lengthening amputated digits and thumb. \(^5\) Later on it was modified to improve the arc of rotation of the pedicled stump by changing its pivot point. \(^5\) Pistre \textit{et al.} described a modified on-top-plasty technique, in a series of 5 patients, in which they lengthened the finger stump by transfer of an adjacent amputation stump with a reverse blood flow finger stump. \(^6\) It was the constrained pedicle length and frequent venous congestion associated with this pedicled on-top plasty that Akin described micro-vascular transfer of the stump for finger reconstruction. \(^7\) But Moss had already reported the thumb reconstruction using micro-vascular transfer of the injured fingers. \(^8\)

Cavadas described the micro-vascular free on-top plasty in multidigit amputations. \(^9\) He was of the opinion to achieve a more harmonious digital profile in patients with amputations of 2 fingers proximal to PIP by transferring one of the stumps on top of the other.

Present case had thumb amputation along with the amputation of the three adjacent fingers. Whereas index and middle fingers were chopped at the MCP joint level, the ring finger was amputated at PIP joint level with intact proximal phalanx. Patient was offered toe to thumb transfer but he refused. On-top plasty was then planned to reconstruct a new thumb from the injured proximal phalanx of the ring finger. It was based on the palmar digital neurovascular bundle and dorsal digital vessels were sacrificed to gain the necessary mobility. Index, middle and ring finger metacarpals were refashioned to create a smooth web space between the new thumb and little finger. The new mobilized stump of the ring finger was fixed at thumb site with k-wire. Although the ulnar side of the new thumb and whole of the web had normal palmar skin cover, lateral side of newly constructed thumb had to have skin graft coverage. Wire was removed after 4 weeks. Patient gained good movement at the MP joint and had good apposition with little finger.

Although, free toe-to-thumb option did exist but multiple factors, including refusal by the patients, time and economical constraints, lead us to a more simple and reliable option. Utilization of this option may be recommended for thumb reconstruction, in cases with other injured fingers as it is more reliable, easier to perform, does not add to the morbidity and makes good use of the injured fingers.

REFERENCES