Case Report

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On-top Plasty for Reconstruction of Thumb Using Index Finger

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ABSTRACT

Thumb is very important for hand function. Many options are available to reconstruct injured thumb from simple dressing (pulp injury without bone exposure) to replantation and toe transfer (significant loss of thumb length). In chronic setting, where other fingers are intact, on-top plasty can be used to reconstruct injured thumb. In this study, a case of a boy who lost his thumb in a road accident is presented. Thumb reconstruction was performed using partially injured ipsilateral index finger. At two months, successful restoration of form and function were noted.

Keywords: Index finger on-top plasty; thumb injury; thumb reconstruction.

INTRODUCTION

Thumb contributes to 40% of overall hand function and loss of thumb can result in significant deficiency in hand function.[1] The ultimate aim of any thumb reconstruction is to provide sensate and non-tender thumb tip, stable joints, adequate strength, correct position and mobility for better prehension. Selection of the technique depends on the level of loss, status of remaining hand, absence or presence of thenar musculature, patient factors such as age, occupation, hand dominance and expectation.[2] In this study, post-traumatic loss of thumb reconstructed by using index finger on-top plasty is described.

CASE REPORT

A six year old boy presented with posttraumatic deformity of right hand after six months of incident (bus accident). Initial management was done at a local hospital which involved dressing and splinting. Physical examination revealed a shortened stiff index finger, collapsed thumb and very badly contracted first web space (Figure 1 a, 1 b). He could not use the thumb at all and the right hand was used only as a spatula. X-ray examination revealed deformed middle phalanx of the index finger with loss of its proximal half. The proximal interphalangeal (PIP) joint was represented by the articular cartilage on the head of proximal phalanx and eroded proximal end of the middle phalanx, while distal interphalangeal (DIP) joint looked fine. The proximal phalanx of thumb was completely missing. Distal phalanx was also deformed mostly at the base but the first metacarpus looked fine (Figure 1 c).

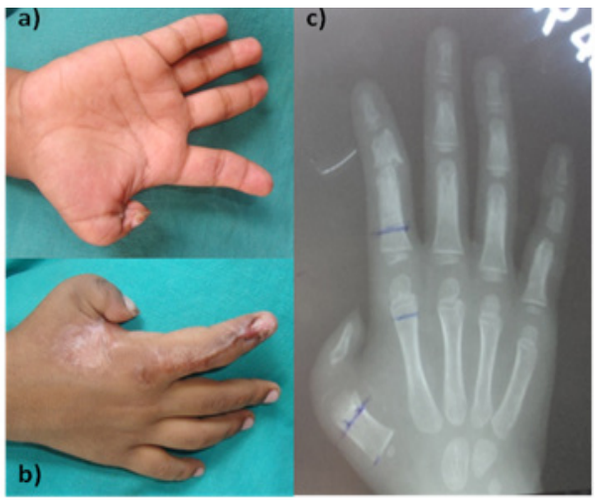

Figure 1. Pre-operative images. a) Volar view; b) Dorsal view; c) X-ray

The shortened and stiff index finger was planned to use for the reconstruction of thumb. Under general anesthesia and tourniquet control, classical pollicization incision was used with inverted V incision on the dorsum and transverse incision on the volar aspect of index finger. All the extrinsic flexor, extensor and intrinsic tendons and neurovascular bundles were preserved carefully. Osteotomies were performed on the index finger at the level of metaphyses of the base of proximal phalanx and distal end of metacarpus. Similarly, the first metacarpus was osteotomized at distal metaphyseal level. Radial digital artery to the long finger was divided whereas ulnar digital nerve to the index finger was split proximally along the common digital nerve to facilitate

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the mobilization of index finger to its new position on top of the first metacarpus. The new thumb was placed at 45 degrees of abduction and 110 degrees of pronation. Bone was fixed with single 0.75 mm Kirschner wire (K-wire) driven from proximal to distal direction obliquely leaving proximal end out of the skin to facilitate removal later on.

Figure 2. Post-operative images. a) Volar view; b) Dorsal view; c) Side view

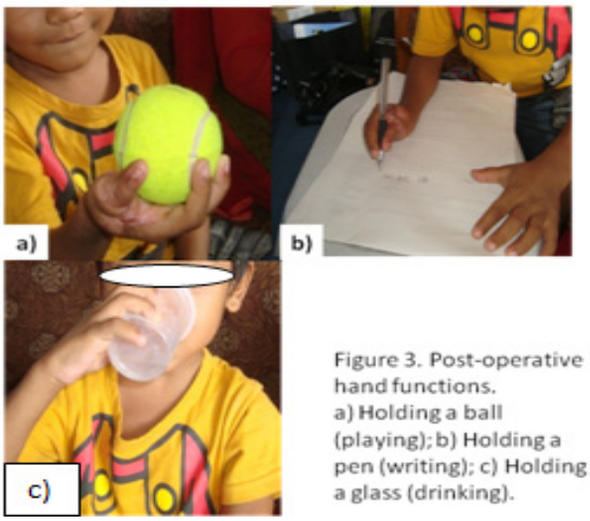

Figure 3. Post-operative hand functions. a) Holding a ball (playing); b) Holding a pen (writing); c) Holding a glass (drinking).

The exposed proximal end of the K- wire was bent to hide the sharp end. Extensor digitorum communis slip to index was used as abductor pollicis longus. Extensor indicis proprius was used as extensor pollicis longus with some shortening to adjust the tension. Flexor digitorum profundus was used as flexor pollicis longus whereas superficial flexor was used as flexor pollicis brevis. First dorsal interosseus was sutured to the radial collateral ligament and first volar interosseus was sutured to ulnar collateral ligament of the new metacarpophalangeal (MP) joint. Tourniquet was deflated and vascularity was checked before closing the skin flaps. Thumb skin flaps were kept till the end to surface the first web-space. The nail and excess skin was discarded along with the distal part of the first metacarpal and distal phalanx. A forearm based thumb spica plaster of Paris (POP) splint was used. Vascularity was monitored intensively over first 24 hours in the postoperative ward. First dressing was done on the fifth postoperative day and a thermoplast splint replaced the POP splint on second postoperative week. K-wire was removed on third postoperative week. At eight weeks, noticeable improvement in esthetic appearance and function was seen (Figure 2 and Figure 3) and video.[3]

DISCUSSION

Patient with as much as one centimeter of proximal phalanx stump will need no major reconstruction.[4] Replantation is the first option in any traumatic loss of thumb at proximal level.[5] When replantation is not possible due to various reasons including late presentation, other measures of reconstruction are used such as toe transfer, pollicization, or on-top plasty.[6]

In this case, the thumb was collapsed and unstable after the complete loss of proximal phalanx which probably could be due to complex compound fracture at the time of injury. Consecutive infection and sequestration might have resulted to bone extrusion. Therefore, it was similar to having amputation at the level of MP joint.

One of the reconstructive options in such case could be toe transfer which would require amputation of normal toe. Resulting functional morbidity is higher with great toe as compared to second toe transfer.[7] The cosmetic and functional morbidity related to toe harvest is of more concern in Asian countries than elsewhere which necessitates replacement of harvested toe by a deformed finger or thumb.[8] Therefore, on-top plasty using stiff, shortened and yet stable index finger was the best option in this case which is also supported by literature review.[9-13]

CONCLUSIONS

Partially non-functional or injured index finger can be used to reconstruct post-traumatic loss of thumb by on-top plasty.

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