



Thumb Reconstruction

Using Microvascular Second Toe to Thumb Transfer

A 50-year old male patient was a victim of an explosive injury. Among other induced injuries, he lost his right thumb at the level of the metacarpophalangeal joint; *figure (1)*. The cutaneous coverage of the stump and the 1st metacarpal bone was severely scarry. Moreover, the 1st metacarpal bone itself has subjected to a considerable loss of its bony mass and was severely angulated as well (> 30 degree); *figure (2)*.

The right hand is dominant. Therefore, the thumb reconstruction has for sure been indicated. As mentioned above, the radiographical findings concerning the 1st metacarpal bone, and the bad situation of the regional skin, both were incompatible with the 1st metacarpal bone's elongation process. Hence, I was apt to the second option; i.e. to the thumb reconstruction using the microvascular left second toe to the right thumb transfer.

Two wires of Kirschner were used to stabilize the bony montage. The 1st K-wire is axial, whereas the second K-wire is anti-rotatory oblique; *figure (8)*.

The implant's artery has been anastomosed to the radial artery, end-to-lateral anastomosis, in the radial side of the wrist. The implant's vein has been anastomosed to the cephalic vein, end-to-end anastomosis, in the same region.

The tendon of flexor digitorum profundus of the neo-thumb is animated by the flexor pollicis longus muscle of the ancient thumb. The tendon of the extensor digitorum longus of the neo-thumb is animated by the extensor pollicis longus muscle of the amputated thumb. Intentionally, I overcorrected the extension of the new thumb in order to overcome the spontaneous flexion of the interphalangeal joints of the second toe. The remained-intact thenar muscles will give the neo thumb the force and the dexterity as well.

To sensibelize the new thumb, the two collateral nerves of the implant (the second toe) were sutured to the ulnar collateral nerve of the amputated thumb.



Figure (1)

Pre-operative View- The Right Hand

The right thumb is amputated at the level fo the metacarpophalangeal joint (degree III). The distal phalanges of the index and the ring finger are also amputated.



Figure (2)

Pre-operative Radiography- The Right Hand

Notice the malunion of the 1st metacarpal bone. It lost most of its mass, and is angulated for more than 30 degree. It is also 25% shorter than the normal contralateral homologue.

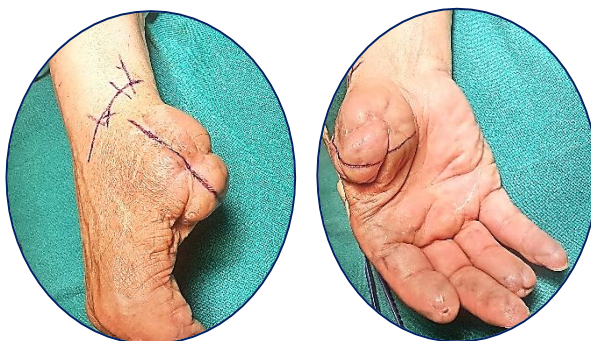


Figure (3)

Per-operative Views- The Surgical Lines

At the amputation stump, the anterior-posterior surgical line is to approach the bony stump, the two collateral nerves, and the profound flexor tendon if it is still in situ. At the anatomical snuff, the oblique surgical line is to approach the long extensor tendon, the recipient radial artery, and the recipient cephalic vein for the coming vascular anastomosis.

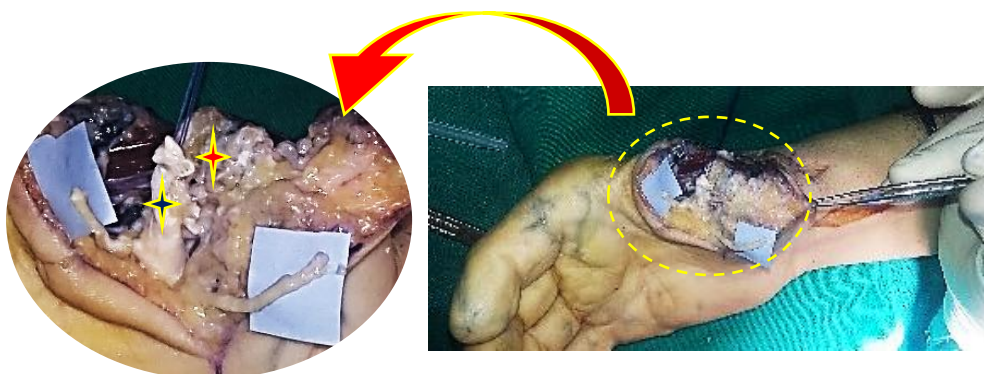


Figure (4)

Per-operative View of Recipient Site- Surgical Anatomy

The two collateral nerves are on the blue backgrounds.

In-between is the tendon of flexor pollicis longus muscle (black star).

In behind is the 1st metacarpal bone (red star).

N.B. The right photo is a magnified view of the left.



Figure (5)
Per-operative View- The Left Foot
A triangle dorsal skin flap is harvested with the second toe flap to ensure the veinous return.



Figure (6)
Per-operative View- The Secon Toe Flap in Situ

(Per-operative Video^{*})



Figure (7)
4-day Post-operative View- The New Thumb
(2-month Post-operative Videos)^{**}

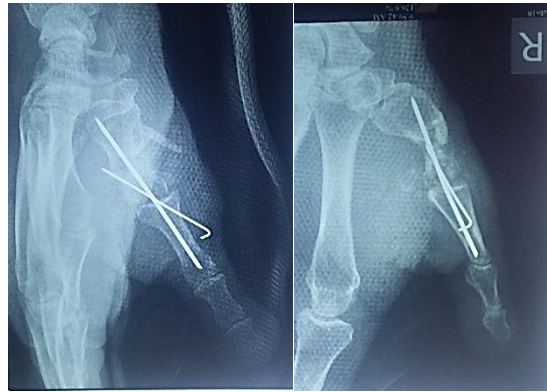


Figure (8)

5-day Post-operative Radiography

The first phalanx of the second toe has become part of the 1st metacarpal bone. The new 1st metacarpal bone became longer than the original in order to compensate the short of the distal phalanges of the new thumb. Two wires of Kirschner are used to fix the montage. One of the K-wires is axial, while the other one is anti-rotatory oblique. The axial K-wire has been slightly bent backward in order to compensate the induced flexion of the 1st metacarpal bone.

(^{*}) "[Per-operative Video, the Harvested Second Toe in Situ](#) "

(^{**}) "[3-month Postoperative Video 1](#) "

" [3-month Postoperative Video 2](#) "

In another context, one could read:

- ***Neural Conduction, Personal View vs. International View (Innovated)***

 ***Neural Conduction, Action Pressure Waves (Innovated)***

 ***Neural Conduction, Action Potentials (Innovated)***

 ***Neural Conduction, Action Electrical Currents (Innovated)***

 ***The Function of Action Potentials (Innovated)***

 ***The Three Phases of Neural Conduction***

 ***Neural Conduction in the Synapse (Innovated)***

 ***Sensory Receptors***

- ***Nodes of Ranvier, the Equalizers (Innovated)***

 ***Nodes of Ranvier, the Functions (Innovated)***

 ***Nodes of Ranvier, Function N1 (Innovated)***

 ***Nodes of Ranvier, Function N2 (Innovated)***

-  [*Nodes of Ranvier, Function N3 \(Innovated\)*](#)
- [*The Philosophy of Pain, Pain Comes First! \(Innovated\)*](#)
- [*The Philosophy of Form \(Innovated\)*](#)
- [*Spinal Injury, pathology of Spinal Shock, Pathology of Hyperreflexia*](#)
-  [*Spinal Shock \(Innovated\)*](#)
-  [*The Clonus \(Innovated\)*](#)
-  [*Hyperactivity Hyperreflexia \(Innovated\)*](#)
-  [*Hyperreflexia, Extended Sector of Reflex*](#)
-  [*Hyperreflexia, Bilateral Responses*](#)
-  [*Hyperreflexia, Multiple Responses*](#)
- [*Nerve Conduction Study, Wrong Hypothesis is the Origin of Misinterpretation \(Innovated\)*](#)
-  [*Wallerian Degeneration \(Innovated\)*](#)
-  [*Neural Regeneration \(Innovated\)*](#)
- [*Wallerian Degeneration Attacks Motor Axons, While Avoids Sensory Axons*](#)
-  [*Barr Body, the Whole Story \(Innovated\)*](#)
-  [*Boy or Girl, Mother Decides!*](#)
-  [*Adam's Rib and Adam's Apple, Two Faces of one Sin*](#)
-  [*The Black Hole is a \(the\) Falling Star?*](#)
-  [*Adam's Rib, could be the Original Sin?*](#)
-  [*Pronator Teres Syndrome, Struthers like Ligament \(Innovated\)*](#)

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