**Case Report**

**Hand Replantation Case Report using a Single Vein Anastomosis in a Severe Crush Injury**

Ahmed Ibrahim1*, Ahmed Aboelnaga1, Ahmed Mehanna1, Ahmed Eltayar2, Abdel Rahman Basha1, Malek Elsayed1 and Amr Moghazy1

1Department of Surgery, Suez Canal University Hospitals, Suez Canal University, Egypt
2Department of Orthopedics, Suez Canal University Hospitals, Suez Canal University, Egypt

**Abstract**

A 15-year-old male who presented to Suez Canal University Hospitals in March 2018 with a severe crush injury to his forearm and amputated hand. Ischemia time was 4 h. On examination, the amputation was at the level of the distal third of the forearm with massive tissue loss. To help primary anastomosis of the vessels, bone shortening was done from the amputated part, followed by temporary fixation of the hand by two K-wires in the radius and ulna. End-to-end anastomoses were done for both Ulnar artery and cephalic vein. The final outcome of the patient, after one year, was regained sensation of the hand and holding objects.

In conclusion, cephalic vein reconstruction as a single vein could sustain a whole replanted hand with no congestion. This technique should be encouraged whenever applicable as it might save the hand.

**Introduction**

Since 1962, when Malt and McKhann [1] performed the first successful replantation of a complete arm amputation, finger and hand replantation have been rising. The challenge has changed from salvage to optimize functional outcomes. In this regard, endeavors to replant previously classified non-replantable cases are increasing.

**Objectives**

The main objective of this case report is to record that single vein repair (cephalic vein), might yield successful hand replantation. The secondary objective, however, is not to always consider crush injury as an absolute contraindication to replantation.

**Case Presentation**

A 15-year-old male presented to the Emergency Department of Suez Canal University Hospitals, in March 2018 at 7 PM, with a crush injury to his forearm. On examination, the distal third of the right forearm was completely degloved. The skin over the middle and proximal thirds showed massive devitalized skin. The hand was completely amputated. The cause of the accident was falling from a train, and the ischemia time was 4 h (warm ischemia time). Exploration was done in the operative room and there was massive crush injury to the forearm muscles, skin, tendons, nerves and vessels and the wound was highly contaminated. After consultation, replantation trial was realized by two teams: one to prepare the hand and the other to prepare the forearm vessels. The patient was shocked and his hemoglobin was 7 gm/dl after blood transfusion, so the decision was taken to only do vascular anastomosis and wait to see the outcome. As the outcome was doubtful, the decision was to do bone shortening from the amputated part to allow primary anastomosis and avoid vessel grafts. Temporary fixation of radius and ulna was done by two K-wires. End-to-end anastomoses were done for both the Ulnar artery and cephalic vein; all other veins were crushed. Complete covering of the re-anastomozed vessels was possible but by the forearm muscles only. Defatting of the degloved skin was done and was applied, after several pecking, as immediate FTSG (Figure 1-6). Operative time was 5 h. The patient was given intravenous antipyretic, antibiotics to cover gram-positive, gram-negative and anaerobic bacteria (Amoxicillin clavulanic acid, third-generation cephalosporin and metronidazole), and one liter of crystalloids daily. Additionally, Low Molecular Weight Heparin was given 40 mg twice daily and Aspirin 75 mg tablet daily, oral feeding was encouraged postoperatively. No postoperative complications occurred.
except for a partial loss to the graft and anemia was corrected by blood transfusion. One month later, a second surgery was decided to complete the repair of structures of the volar aspect of the wrist. Ulnar nerve repair was done by an end to end anastomosis, while the median nerve was repaired by cable nerve graft. FDP tendons were directly sutured to the proximal FDP muscle belly as at this level there were no tendons proximally. Coverage of the lost graft area was done by a random lower right abdominal flap. One month later, the third surgery was done to separate the abdominal flap and to repair the extensor tendons by direct suturing (direct suture??). The patient was hospitalized throughout the 3 stages (2 months) as his home town was very far, and even there, he had no one to look after him. The patient was discharged and advised to receive physiotherapy. Presenting one year later, for the first time after discharge, he showed partial regain of sensation in his hand, especially on the medial aspect given the fact that the palmar and dorsal cutaneous branches were crushed in addition to the superficial radial nerve. However, the functional movements of the tendons were not fully regained; probably due to factors related to physiotherapy. Nevertheless, he was able to catch objects. The patient was satisfied that his hand was not amputated.

**Discussion**

The contraindications for hand and digital replantation have been described in many articles [2-5]. Contraindications included, but not limited to severe avulsion, crush injuries and long ischemia hours. In 2007, Molski [6] presented a case series of successful replantation for fingers and hand after crush-avulsion amputations, where massive debridement was made. Similar to our case, bone shortening was decided to ensure end to end anastomosis of the nerves and vessels. According to literature, multiple venous anastomoses are always important. Weiland et al. [7] mentioned that there should be at least 2 veins for every arterial anastomosis. Moreover, Shrestha and Chang have even gone beyond that; recommending an additional vein, relative to the number of anastomosed arteries, should be anastomosed. This is particularly overstressed upon in zone 3 amputations, where anastomosing as many veins as possible is advocated [8]. In case of congestion, medicinal leeches can be an alternative to re-exploration for subsequent treatment of thrombosis or revision of the anastomosis [9]. In 2013, El-Sayed Ahmed presented a nearly similar case report of hand replantation using only one vein. He concluded that hand replantation can survive using only one vein which is the cephalic vein. The difference between his case and ours is that he reconstructed two arteries and not one as in our case.
Conclusion

A hand might survive with anastomosis of a single artery (ulnar) and a single vein (cephalic). Furthermore, shortening of the bone and direct anastomoses might enhance this procedure.

References