



SUCCESSFUL MAJOR HAND REPLANT FOLLOWING 24 HOURS OF ISCHEMIA: A CASE REPORT

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ABSTRACT

The hand is considered an integral organ of the body and plays an important role in body image and sense of identity. Complete amputation at the level of wrist joint has excellent potential for functional recovery following successful replantation when the warm ischemia time of 6 hrs and cold ischemia time of 12 hrs is maintained. We would like to present this case of 36 yr old lady, with total amputation of left hand at wrist level who came with delayed presentation (>24 hrs). Patient was hemodynamically stabilized and taken up for surgery under regional anaesthesia. All structures identified and repaired in sequential manner. 2 arteries and 2 veins were anastomosed and post operative period was uneventful. Ideally, success rates are better when replantation is attempted within 6 hours. In this case, patient presented to us >24 hrs later and yet the hand survived with good functional outcome

KEYWORDS : .major hand replant, wrist level, delayed presentation

Introduction:

Replantation is the reattachment of a part that has been completely amputated- no connection exists between the severed part and the patient. *Macroreplantation* refers to amputation proximal to the carpal bones. *Revascularisation* is repair of a part that has been incompletely amputated- some of the soft tissue (skin, nerves or tendons) is intact.

Following the first successful arm replant by Malt and Mckhann in 1962, and first thumb replant by Komatsu and Tamai in 1968², there has been tremendous growth in microsurgical techniques of replantation. In view of the varying degree of success and failures in the following decades, criteria for replantation has been established to expect reasonable survival and functional recovery based on: general condition of the patient, level of amputation, mechanism/type of injury, ischemia time, vocation and age of the patient.

Complex amputations are those that challenge or do not follow these general guidelines.

The ischemic time is one of the significant factors in determining if replantation should be attempted. It is an important predictor of successful outcome. The longer the ischemic time, greater are the changes in cellular metabolism in the amputated segment (especially in the muscles). These changes can produce permanent damage and a reperfusion syndrome after replantation. Hence, it is ideal to minimize warm ischemia time to less than 6 hours to avoid muscle necrosis. Even when properly preserved, if the cold ischemia time is >12 hours especially in proximal amputations, replantation is generally not attempted. However, successful hand replantation has been reported even after 54 hrs of cold ischemia.³

We report a case of major hand replantation at the level of the wrist who presented to us following >24 hrs of cold ischemia.

Case Report:

A 36 year old, right hand dominant lady was referred to our Institute of Research and Rehabilitation of Hand & Department of Plastic Surgery (IRRH&DPS) at Stanley Medical College and Hospital on 18 august, 2015 at 6 pm, 23 hrs after her left hand was totally amputated at the wrist level during a domestic violence at home using a knife on 17 august, 2015 7pm. The patient hails from Gudur, Andhra Pradesh and went to a local hospital for emergency care, where the distal part was placed in an ice pack and was referred to higher centre (Figure 1).

Figure 1: Total amputation of left hand at the wrist level



On examination, there were multiple lacerations over the scalp and forehead (Figure 2). Patient was in hypovolemic shock. X ray showed amputation through the carpal bones (Figure 3). Patient was resuscitated with blood, IV fluids; primary wound management of the scalp/forehead lacerations was done and CT Brain was taken to rule out head injury.

Figure 2: Patient presented with multiple laceration on the forehead and scalp



Figure 3: pre operative x ray of left hand showing amputation through the carpal bone level



After taking informed consent, decision to attempt replantation was taken at 25th hour. The entire procedure was done under regional anaesthesia- USG guided supraclavicular block with cannula in neck. Distal part and proximal forearm was dissected and all structures were identified and tagged. Wrist was stabilised using k wire fixation and soft tissue structures were repaired in a sequential manner.(Table 1, Figure 4)

Table 1: Sequence of surgery

SEQUENCE OF SURGERY
Locating and tagging of structures
Debridement
Bone fixation
Repair of extensor tendons
Repair of flexor tendons
Repair of nerves
Anastomosis of artery and vein
Skin closure

Figure 4: intra operative pictures following k wire fixation through the metacarpal of marginal fingers and repair soft tissue structures



Post operatively patient recovered well maintaining hemodynamic stability. Patient was kept in ICU with the hand in AE slab with hand elevation. Viability of the hand was monitored postoperatively clinically looking for signs of ischemia. She was given IV Fluids 6 pints/day for the first 5 days, and transfused 2 units of blood. Inj low molecular weight heparin was given intra operatively which was continued for 5 days. IV antibiotics covering both gram positive and gram negative was given for 1 week.

Figure 5: post operative picture showing hand in POP



Patient developed raw area on the volar aspect of the wrist on the 8th POD, which was healed by split skin graft. Graft site settled well.

Our post operative protocol included- wound inspection on the 5th and 10th POD, suture removal on 14th POD. At 2 weeks, active movements of the wrist and fingers was initiated within the POP. At 3 weeks, POP was discarded and continued active mobilisation within the confines of external splint. At 6 weeks, the splint and k wire was removed and patient was advised active and passive mobilisation of wrist and fingers.

Figure 6: post operative picture at 6 weeks, after k wire and splint removal.



Functional evaluation was done at 6 months post operatively. The patient recovered static 2 point discrimination of 20 mm in all three peripheral nerves. Her pinch strength was 40%, grip strength was 40%. Active flexion and extension of the wrist was possible up to 350. Active range of motion of all fingers was 200 (Figure 6).

Discussion:

Functional results in replanted hands at the level of wrist or distal forearm have been consistent- 80-90%^{4,5}, provided the ischemia time is within acceptable range. Longer the ischemia time, lesser is the chance of survival. However, reports suggest that in many cases survival and functional recovery is not compromised by prolonged ischemia time⁶. Other factors precluding early replantation include resuscitation in patients with hypovolemic shock, multiple trauma, and life saving surgery prior to replantation. In a series of 14 patients undergoing 25 replantations after prolonged ischemia of more than 24hrs, Lin et al⁷ reported a success rate of 64%, with satisfactory functional result in most of the patients of the series.

Conclusion:

Major hand replantation of complex amputations is a balanced decision based on various parameters and its findings. Prolonged ischemia time is often a key factor involved in taking a decision of replantation. In view of the advances of the microsurgical technique, salvage of the injured hand must always be the goal and major hand replant can be attempted even when patient comes with delayed presentation with successful outcome with good functional recovery.

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Conflicts of interest:

There are no conflicts of interest.

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