



THE FATE OF REVASCULARIZATION IN VASCULAR INJURY OF INCOMPLETELY AMPUTATED HANDS.

Plastic Surgery

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ABSTRACT

We report the fate of vascular injuries in cases of incomplete amputations or near amputation of the hand zone 5 injuries after immediate and late revascularization. Out of 15, 10 patients underwent primary bone fixation, all 15 underwent tendon and/or skin repair for hand injuries with both vessels that is radial and ulnar in all 15 patients. Revascularization were done after more than 6 hours in 6 patients. Delayed revascularization also yielded the good result without any complications in terms of survival of hand, whereas functional outcomes were variable depending upon the time since repair and also the patient's physiotherapy. We conclude that neglected vascular injury associated with incomplete amputation of hands can be overcome in some patients by revascularization even after prolonged ischemic time. Whereas functional recovery is related to time since repair of nerves and post-operative physiotherapy protocols.

KEYWORDS

Revascularization, Hand injuries, Incomplete amputation, Vascular injuries

INTRODUCTION:

Among the young adults traumatic hand injuries is one of the commonest reason for complete or incompletely amputated hands and high energy trauma being the common etiological factor among the many causes e.g. Assault, trauma and work related injuries. These injuries are often challenging for both i.e the surgeon and the patient, specially it is a life-changing event in patients life and more catastrophic if dominant hand is involved. These injuries lead to multiple and lengthy surgeries with increased number of days of hospitalization which further leads to psychological disturbance and increased financial burden. [1-4]

In 1964 first successful limb replantation was reported by Ronald Malt. [5] Whereas increasing experience and advances in microsurgery not only made the replantation of the amputated or near amputated hands possible but also yielded good survival rate and better functional and aesthetic outcomes with success rates of 80-90%. [6-9]

Following the revascularization or replantation our aim is not mere survival but also the functional and aesthetic outcomes which further will have improved psychological recovery and reduced financial burden on patient.

Although the functional outcome of replanted hands will never equal to that of the normal healthy counterpart, the aim of surgery is to produce major functional, cosmetic and psychological improvements in these patients. [9]

MATERIALS AND METHODS:

15 patients who underwent revascularization for incomplete from May 2022- August 2023 were analyzed for this study. All the patients coming to or referred to department of plastic surgery Gandhi Medical College, Bhopal with incomplete or near amputations of hand who underwent surgery were included in the study. Patients having history of Peripheral vascular disease, mutilated hands, mangled hands, multiple level injuries were excluded from the study.

All the patients underwent surgery with repair of both arteries i.e radial artery and ulnar artery with repair of flexor tendons with or without extensor tendons, median and ulnar nerves. Intraoperatively vessel repair was done after preparing the vessel with heparinized saline and/or Fogarty's catheter.

All the patients were given early physiotherapy according to klinert's protocol from day 3 post operatively. All the patients were followed up

for minimum of 6 months and were assessed for functional outcomes in terms of return to day to day activities or return to work and aesthetic outcomes was assessed in terms of patient satisfaction.

Observations:

Out of 15 patients who were included in the study 13 of them were males (87%) and 2 were females (13%) [Chart-1]. The mean age was 28 years (range 16-55 years). Most common mode of injuries was due to assault (47%) followed by road traffic accidents (33%) and workplace accidents (20%) [Chart-2]. Major portion of patients belonged to the low socio-economic group. Most common site of defects involved flexor aspect of forearm (70%) followed by wrist (30%). SPO2 was absent on clinical examination in all fingers of incomplete amputated hands (fig-2 a,b). Out of 15 patients 10 patients (67%) underwent primary bone fixation followed by Ulnar and radial arteries repair respectively in all the 15 patients. In all 15 patients ulnar and median nerves were repaired with flexor tendons in zone 5. (fig:1,2,3)

In 6 patients (40%) revascularization was done after 6 hours post trauma. Out of 15 4 patients (27%) had post op congestion and out of 15 patients 2 (13%) needed re-exploration and revascularization. Survival rate in all 15 patients was 100% as none of the patients underwent amputations. Whereas result was variable in terms of functional recovery and aesthetic appearance. Out of 15 patients 11 patients (74%) were able to return to their work on follow up of 6 months and were doing their day to day work whereas 4 patients (26%) who were not on regular follow up and were not compliant to physiotherapy had poor functional results. They had suboptimal outcomes in terms of joint stiffness, poor sensory and motor recovery.

DISCUSSION

Previously published data by various clinical centres worldwide that provided replantation and revascularization services had reported success rates ranging from 61.6% to 96.0%. This prospective observational study yielded the same result as at par with high volume centres. In our study we have found that in patients who underwent revascularization even after the critical time of ischemia i.e 6 hours post trauma yielded an equally good result in terms of hand survival in incompletely amputated hands which can be due to preserved arterial or venous supply from the dorsal aspect of upper limb. In general, viability rates for revascularization are better than those for replantation because adequate venous drainage often remains intact in revascularized amputations. [10]. In our study, analysis of patient factors (age, sex, smoking & alcohol intake) and factors related to amputation (level and type of injury) showed no significant influence

on the overall survival rate which might be due to small sample size. Whereas functional outcomes were poor in the patients who did not followed up regularly and were not compliant to physiotherapy. They further had joint stiffness and also poor sensory and motor recovery and could not resume their day to day work. These patients were unsatisfied as they could only have an aesthetically good hand which is functionally suboptimal.

CONCLUSION:

In sharp cut incomplete amputation injuries of hands have good outcomes with revascularization in terms of survival rates even in late revascularization because of preserved dorsal supply. Whereas functional recovery was variable due to patient factors depending upon their follow up and their compliance for post operative physiotherapy.

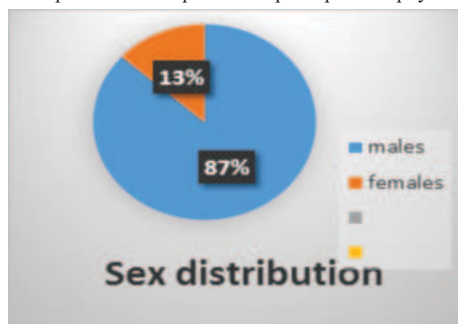


Chart:1

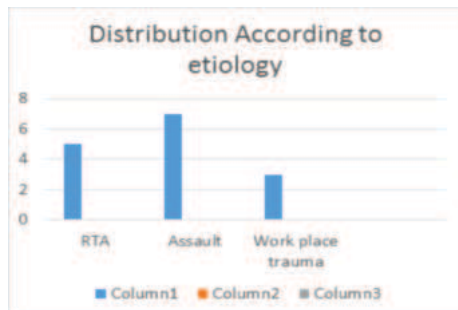


Chart :2



(a) (b)

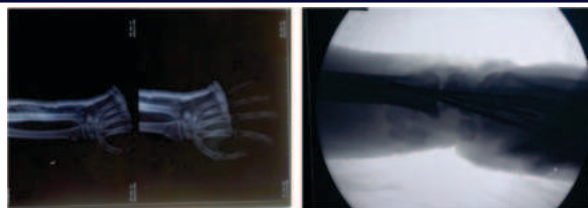


(c) (d)

Fig:1 Case of assault in 17 year old male (a) At the time of presentation (b) after the repair of ulnar artery (c) after repair of radial artery (d) on follow up



(a) (b)



(c) (d)



Fig:2 Case of 42year male with injury at work place with crusher machine (a,b) at time of presentation with unrecordable SPO2 (c) Pre operative x-ray showing distal end radius fracture (d) After K-wire fixation of fracture (e) after the repair of radial and ulnar arteries



(a) (b)



Fig:3 Case of 28yr male with history of road traffic accident (a) Pre operative picture (b) after repair of ulnar artery and nerve (c) After repair of FDP tendons (d) On follow up

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