

Failed Mid-arm replantation in poly-traumatized patient with mandibular fracture and head trauma; Case Report

Background:

Amputations in general and amputations of upper extremities, in particular, have a major impact on patients' daily life activities, social interactions and work capacity.

Although the numbers of major traumatic amputations have been declining over the years as a result of continuous progress in occupational safety activities, major amputations of upper extremities are reported to have an average prevalence of 11.6/100.000 individuals in Europe [1].

Young, active males are more often affected by upper extremity amputation, which often result from high-energy trauma. As major amputations are often accompanied by multiple, life-threatening injuries following high-energy trauma, the possibility for replantation in these patients is restricted to prevent further harm caused by additional systemic problems occurring after revascularization. [1]

While an amputation is the sum of a vascular injury, an open fracture, a soft tissue injury, and a nerve injury, reattachment of the individual parts can result in severe morbidity during and after surgery. [2]

When undertaking upper extremity replantation, one must be mindful of immediate and future goals, including arm revascularization and future recovery of function. In cases where replantation is not possible, one should always attempt to salvage enough of the proximal extremity to fit with prosthesis.[2]

Only after the patient is stabilized by multidisciplinary trauma team can limb salvage be considered. For efficiency in the operating room, multiple teams are often necessary for a major limb replantation. The major goal is to reestablish limb perfusion and minimize ischemia time.

In this report we will present a dramatic failure in replanting a totally avulsed mid-arm amputation in a poly-traumatized patient.

Presentation to the hospital:

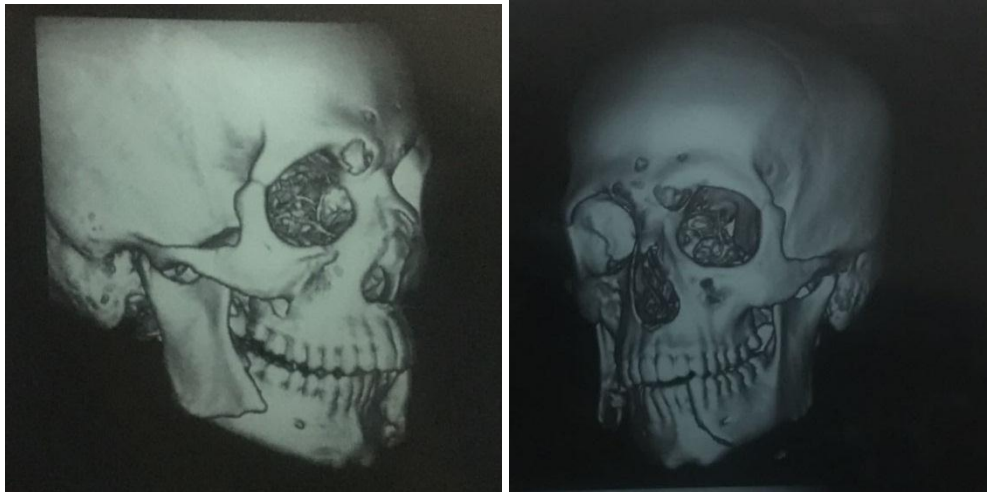
Male patient, 18 years old, student, presented to us with total mid-arm amputation of his right arm due to avulsion injury by a machine in the farm.



There were loss of conscious duo to head trauma (neurosurgical assessment revealed brain edema and frontal contusion with GCS 9), also there were comminuted fracture mandible with flail segment (right body and left para-symphyseal fracture). There were comminuted compound fractures of both bone of the forearm.



The time interval between amputation and hospital presentation was 4.5 hours; the amputated part was brought to us in a bag and covered with dirt and grass. On arrival to the hospital; ATLS survey was done and the patient transported to the operating room immediately.



Surgical procedure:

The patient was in supine position, nasal endotracheal tube done, primary wiring of the mandibular fracture done using dental wire, cleaning and preparation of the amputee, bone shortening was about 5 cm, bone fixation was done by plate and screws, brachial artery anastomosis was done first, venae comitant and basilic veins then anastomosed using vein graft, muscles and nerves then repaired, fixation of radius and ulna fracture by k-wires, finally skin closure and forearm fasciotomy was done.



Post-operative monitoring:

The patient was transported to the ICU with the endotracheal tube and was monitored with good vascularity and capillary refill till day 6 post replantation. The anesthesiologist starts to gradually disconnect the patient from the ventilator in order to assess the degree of consciousness, but unfortunately the patient experience an aggressive fit which resulted in complete tear in the anastomosis.



Revision of the replantation:

The patient transferred to the operative theater again to explore the anastomosis, we found complete tear in the repaired vessels and re-anastomosis was done. The next day the limb starts to be congested and bluish in colour and 3rd exploration done which revealed huge venous thrombus. Venous thrombectomy done and wound was closed. 8 hours later the limb congested again with failure of medical and other conservative measures to save the limb.



Debridement:

On day 8 post replantation we do debridement of the limb and primary closure of the stump.

Fixation of the associated mandibular fracture:

2 weeks post replantation we do open reduction and internal fixation of the bilateral mandibular fracture using plates and screws. Then the patient was discharged 5 days later.

**Discussion:**

The first report of replantation of an upper extremity was made by Malt in 1962; the patient was a young male [3]. Chen performed the first successful hand replantation in China in 1964 [4].

With advances in fixation devices, microsurgical techniques and reconstructive options, subjective and objective outcomes can be reasonable and are (to date) preferable to those of prostheses [5]. Compared with amputations above the elbow, better results have been obtained after sharp and distal injuries [6]

Successful replantation after major upper extremity amputation is possible in 77–93% of cases [7-8].

Blomgren et al. [9] reported success rates of 92% for incomplete and 71% for complete hand replantations at different levels of injury. Amputations proximal to the elbow tend to have disappointing functional results [10]

As major amputations occur frequently with high-energy trauma, accompanied by various and occasionally life-threatening injuries, it is important to primarily address those injuries to save the patient's life [11].

The decision between salvaging or amputating of a limb must be made rapidly. Although therapeutic algorithms have been proposed in the lower as well as in the upper extremity, [12-14] this decision has to be made on a case-by-case basis and has been shown to not be supported by scoring systems, as it is in the lower extremity [15,16].

In addition to improvements concerning surgical techniques, intensive care management has also been enhanced. Due to several systemic metabolic changes and the release of oxidized free radicals, patients might develop systemic reperfusion injuries following surgery [5]. Replantation of an upper limb also bears the risk of local or systemic complications, such as sepsis, rhabdomyolysis with renal failure or delayed wound healing.

Post-operative management has to be interdisciplinary, and it is of the utmost importance to consider the general condition of macro-amputation patients, while also avoiding collateral harm to the patient when saving the limb

Conclusion:

Proximal arm replantation is technically demanding procedure that needs multiple factors to improve the outcome. This includes early presentation to the hospital, perfect preservation of the limb, standard operative room equipment; good post-operative intensive care management and good follow up.

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