



Successful Replantation of an Amputated Hand: Management and Long-term Outcome at the University Hospital of Rabat

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ABSTRACT

Replantation of hands has become common in various institutions. But, many problems remain in our context especially the quality of the preservation and real-time of replantation, making surgical care more difficult and thus undermines functional proof our patients. We report one case of a young patient presented with a total amputation at the wrist joint of the left hand, despite technical problems in our emergency department, replantation was successfully possible with an acceptable functional and aesthetic result. Our patient have recovered a useful function in their replanted hand in daily activities and work. A need of early rehabilitation is stressed and these severe injuries require long periods of rehabilitation; for a good functional recovery, social and professional reintegration of these patients.

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Introduction:

Complete and subtotal amputations of the hand are severe and complex lesions, exposing the patient to a major socio-occupational disability.

Over the last 50 years, advances in microsurgical technique, bone fixation, nerve repair, and tendon repair have allowed salvage of amputated digits, hands, and limbs that would not have been possible in a previous era.

The purpose of replantation is not only the survival of the amputated stump, but recovering a useful function in the active life.

In this paper we report our experience in hand replantation through a case of total amputation of the hand of which we had a good outcome despite some difficulties.

Case report:

A 45 year-old male, right-handed, merchant and in good overall health, presented with total amputation of the left hand in the emergency department after two hours of an assault by a sword blow, the amputation goes through the wrist joint (figure 1). The amputated hand was properly refrigerated.



Figure 1: A total amputation of the left hand at the wrist.

Surgical technique:

Under general anesthesia; the first time is to resect the bone extremities most often at the expense of the proximal segment

for creating a shortening (average 2.5 cm) then bone fixation was performed with two Kirschner wires in X.

In the second time we realized the suture of all deep and superficial flexor tendons, the arterial sutures (radial and ulnar arteries) then the nerve repair, facilitated by shortening; were performed with the naked eye without microscope using separated points by prolene 8/0.

After palmar cutaneous suture, all extensors tendons of the hand and wrist were repaired. Finally, the two dorsal veins were sutured and the hand was immobilized by an intrinsic plaster splint and was kept warm. In total, the intervention lasted on average 6 hours.

Postoperative analgesia and antiplatelet orally for fifteen days were systematic.

Results:

In the immediate suites no complications were observed. A Prudent and active mobilization of the fingers was permitted in the first postoperative days (figure 2), no secondary intervention was performed.

After one month the patient was referred to the reeducation center.



Figure 2: Postoperative appearance after three weeks with active mobilization of the fingers.

The patient was seen in consultation three month after reeducation, and periodically every three months with a mean hindsight of two years (figure 3a and b).



(a)



(b)

Figure 3(a,b): Successful replantation of hand with a good functional and excellent aesthetic result.

Outcome analysis included total active motion of all joints, strength, sensibility, and cold intolerance.

Despite the reeducation, mobility was limited by a deficit of flexion of the metacarpophalangeal joints (palm pulp-gap is 2 to 4cm); the deficit extension metacarpophalangeal joints and proximal interphalangeal joints was between 0° and 20°; one finger was crocheted (thumb).

The overall strength (Grasp) consistently decreased compared to the opposite side it was on average (40%). The force of the clamp (Pinch) was even lower (30%). This significant decrease of the force is due to the low recovery or no recovery of the intrinsic muscles with arthrodesis of the wrist.

The patient recovered a subnormal sensitivity of the hand especially in the territory of the median nerve and he had no cold intolerance.

The average duration of the work stoppage was 6 months; the rate of permanent partial incapacity (PPI) was estimated by 45%, the patient has resumed the same work (merchant).

Discussion:

The studies reported of replantation or revascularization by the hand or digital amputation is considerable especially in female patients. Replantation is the only method that allows resuming normal activities by minimizing the double impact [5, 6]. It is technically challenging surgery with a high chance of failure, yet it can avoid painful neuroma formation or unacceptable cosmetic appearance.

The first replantation of a completely amputated upper limb was performed by Malt in 1962 (replantation of an arm in a child of 12 years); the first replantation of the hand was realized

by Chen et al in 1963[7], its incidence is about 1.9 per 100 000 per year (3.3 in men and 0.5 in women) [8].

Despite microsurgical advances, it is still difficult to achieve satisfactory functional results in complete ring degloving injuries and amputations. Controversy continues regarding whether or not replantation or revision of the amputation should be performed [9 –11].

In general, the survival of limb replantations depends on age (worse in the first and seventh decade, best in the second), the mechanism of injury (best in wounds caused by net section than in crashes and avulsions) [12].

In our context, fortunately that amputation was by net section in a young patient before 6 hours, and given the lack of microscope and microsurgical equipment at the emergency department, we have realized vascular and nerve anastomosis without microscope and with surgical standard hardware.

The functional results were influenced by the associated bony and tendon injuries and justifying the importance of early reeducation [13]. Range of motion, sensory recovery, and patient satisfaction all contribute to the overall outcome after replantation and should be evaluated, not just considering the successful reestablishment of blood flow and digit viability.

A recent study conducted by plastic surgeons at McMaster University in Hamilton (Ontario), on the quality of life after major upper extremity replantations, they concluded that major upper extremity injuries and replantations have a significant impact on patients' long-term hand function, and produce long-term anxiety and depressive symptoms [14].

Financial pressures are having an increasingly large impact on discussions regarding outcomes after replantation because of the costs of the procedures and time off from work for the patient. Evidence-based outcomes and cost accountability may lead to regionalization of hand trauma care, with patients being sent to centers with the highest volume and best outcomes [15].

Conclusion:

The amputations of the hand are common; they are mainly due to assaults.

The management of this kind of patients is difficult in our health care system, owing to the technical problems such as lack of microsurgical equipment in the emergency department, but this was possible with the training of the surgical team, selecting patients and respect of the various steps of the surgical procedure.

The immediate and continuous reeducation helps to recover a useful hand in both social and professional life.

Declaration

The authors declare that they have no conflict of interest.

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