Single Digit Replantation in Outpatient Surgery: Experience of 120 Cases

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ABSTRACT

We performed 120 single digit replantations on an outpatient surgery basis between 1994 and 2001. The levels of amputation were: proximal phalanx in 50 patients, proximal interphalanx in 21, distal interphalanx in 42 and metacarpophalanx in 7 patients. Trauma mechanism included: avulsion (31.7%) and guillotine (68.3%). The mean normothermal ischemia time was 8 h (ranging between 6 – 15h).

Patients stayed in the hospital a maximum of 8 h after the surgery. All of them were told about the possibility of an arterial or venous thrombosis and instructed on how to identify it. Patients who believed any circulatory abnormality was occurring, telephoned the surgeon and were immediately assessed. Reassessment was performed in 20 patients, and circulatory deficits were confirmed in 15 patients. There was replantation loss in 12 of the latter patients.

The replantation success rate was 90%, and the major determining factor was trauma mechanism and not the postoperative regimen. We suggest that single digit replantation be performed whenever there is an indication and that the availability of hospital beds should not be a decisive factor in the choice of the method of treatment of amputations and single digit devascularizations.

INTRODUCTION

Finger amputations are frequent in our environment. Most result from occupational accidents. The socioeconomic impact of these wounds is extremely high, because they affect individuals in a productive age group and lead to long periods away from work, different degrees of sequela and, in most cases, permanent impairment.

The development of microsurgery techniques, after the work of Tamai and Komatsu[1] in 1965, was a breakthrough in the treatment of these wounds by introducing digit replantation into the therapeutic armamentarium of hand surgery. The functional, aesthetic and social impacts of the procedure are remarkable, and enable individuals to return to their activities[2,3].

There is no consensus on the indication of single digit replantation[2-4]. However, some situations, such as a thumb amputation, pose an absolute indication. Amputations in children, distal to the superficial flexor insertion and in the first and third fingers (zone III), have attained better results then other treatment modalities[2-5]. Replantation may occasionally be indicated for professional or aesthetic reasons, for musicians or craftsmen, for example[2,3,6].

Patients submitted to replantations are hospitalized for observation and postoperative care by the medical and nursing staff, attentive to possible complications, such as arterial or venous thrombosis that require the surgical revision of anastomoses.

The major shortage of hospital beds in the Unified Health System (Sistema Único de Saúde-SUS) frequently leads to a conflicting and extremely stressful situation: a medical emergency that needs hospitalization but no beds available throughout the public SUS region. Amputations are even a more critical condition because any delay in replantation can be a determining factor in the postoperative prognosis. Working in these circumstances over many years led us to seek alternative solutions. Thus we began to reimplant single digit amputations on an outpatient surgery basis. The present article describes the experience in 120 consecutive cases.

PATIENTS AND METHODS

The study was carried out at the Plastic Surgery Service of Hospital São Lucas – PUCRS and at Clínica S.O.S. Mão – Porto Alegre – from January 1994 to December 2001.

The levels of amputation were: proximal phalanx (PP) in 50 patients, proximal interphalanx (PIF) in 21, distal interphalanx (DIF) in 42 and metacarpophalanx (MP) in 7 patients. Injuries were more frequent in males (77 patients – 64.2%). The mean age of patients was 24 years (ranging from 15 – 34). Trauma mechanisms were avulsion (38 patients – 31.7%) and guillotine section (82 patients – 68.3%). The mean normothermal ischemia time was 8 hours (ranging from 6 – 15h). The present study only included patients submitted to single digit replantation without any other associated injury, and who could not be hospitalized due to lack of available beds. All patients

Table I

Finger	Level of amputation	Injury Mechanism	Time of ischemia	A-V repaired*	Vascular Thrombosis	Viability after reintervention
Thumb	PP	Guillotine	8	2.2	No	-
Thumb	PP	Guillotine	9	1.2	Yes	Viable
Thumb	DIP	Avulsion	12	1.1	Yes	Loss
Thumb	DIP	Avulsion	9	1.1	No	-
Thumb	DIP	Guillotine	8	1.1	Yes	Viable
1st Finger	MP	Guillotine	8	1.2	No	-
1st Finger	MP	Avulsion	6	1.1	Yes	Loss
1st Finger	MP	Guillotine	7	1.2	No	-
1st Finger	MP	Avulsion	9	1.1	Yes	Loss
1st Finger	DIP	Avulsion	13	1	Yes	Loss
1st Finger	DIP	Avulsion	14	1	Yes	Loss
1st Finger	DIP	Avulsion	11	1.1	No	-
1st Finger	DIP	Avulsion	12	1	Yes	Loss
1st Finger	DIP	Avulsion	12	1	Yes	Loss
1st Finger	DIP	Avulsion	9	1	Yes	Loss
2nd Finger	DIP	Avulsion	10	1.1	Yes	Loss
3rd Finger	PP	Avulsion	13	1.1	Yes	Loss
4th Finger	PP	Guillotine	9	1.2	Yes	Viable
4th Finger	MP	Avulsion	8	1.1	Yes	Loss
4th Finger	DIP	Avulsion	11	1.1	Yes	Loss

Patients reassessed due to suspected vascular thrombosis. *First surgery (replantation).

with reimplantations were hospitalized when beds were available. The sample was not obtained through randomization.

The anesthetic technique was brachial plexus block along with sedation and patients were monitored by an anesthetist. The postoperative hospital stay was eight hours. Some patients left the hospital with their arm still anesthetized (Figs. 1, 2, 3, 4).

A postoperative pre-established protocol was followed: Immobilization with a palmar plaster splint,

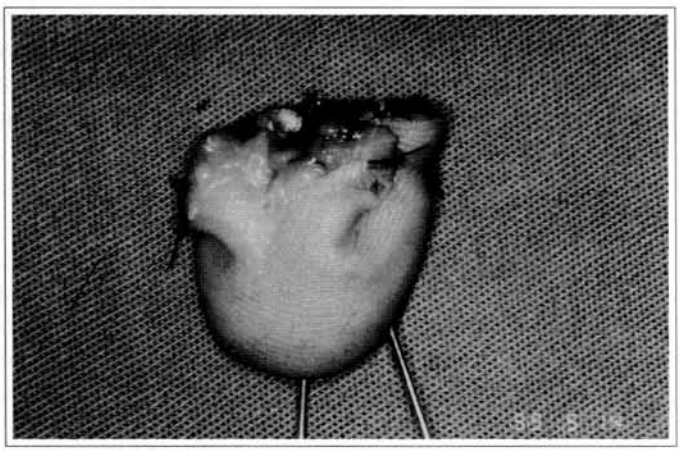

Fig. 1 – Amputated segment, volar view, 1st Finger.

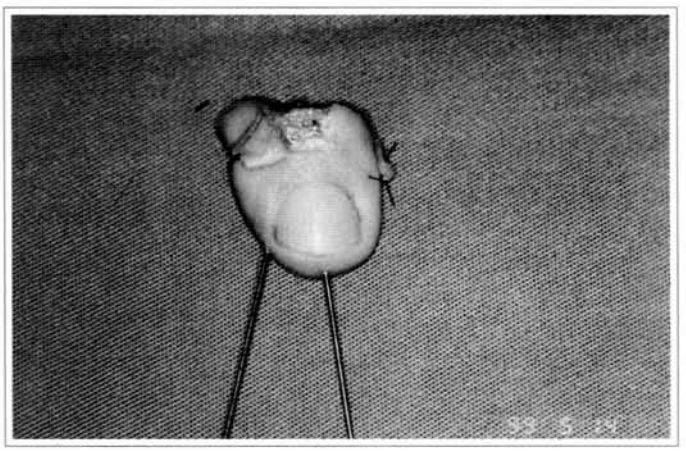

Fig. 2 – Amputated segment, dorsal view, Kirschner sutures for osteosynthesis.

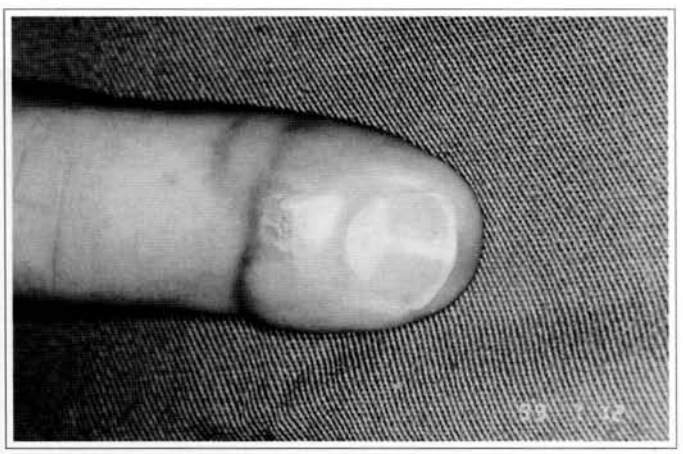

Fig. 3 – Final result.

Fig. 4 – Comparative result against contralateral 1st Finger.

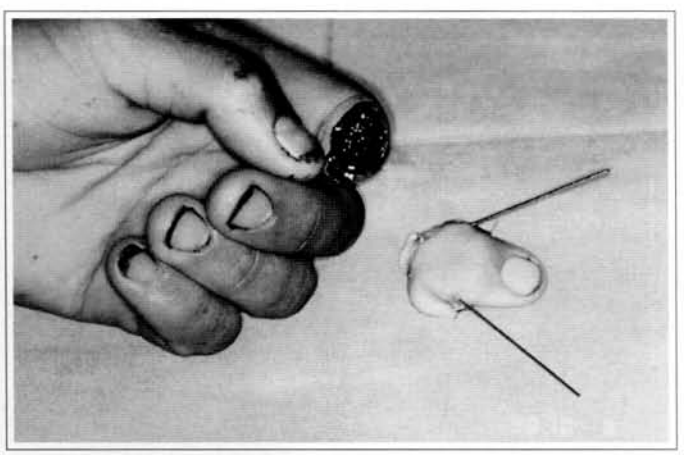

Fig. 5 – Amputation at the medium phalanx level, 1st Finger, right hand.

Fig. 6 – Functional Result.

maintenance of raised upper limb and the body kept warm, postoperative analgesia (acetaminofen-500mg QID), oral anticoagulant (acetylsalicylic acid 150 mg, BID) and instructions to patients on possible circulatory problems. We used easily understood language, based on the color of the amputated segment. If the finger became blue or white, the patient should immediately phone the surgeon in other to be assessed.

We concluded that patients understood instructions adequately, and were able to assess the viability of the reimplanted segment regardless of the level of schooling. All patients were reassessed immediately after they telephoned. Patients who did not consider that the reimplanted segment showed circulatory changes were reassessed one week postoperative in the outpatient clinic (Figs. 5 and 6).

RESULTS

Twenty patients telephoned in with a suspected abnormal circulatory change of the reimplanted segment (Table I). Contact was always within the first 24 hours after the surgical procedure. Re-intervention due to arterial and/or venous thrombosis was necessary for fifteen patients. Reanastomosis was successful in three patients (Table I). Again, all re-interventions were carried out on a day-surgery basis.

In cases in which the reimplanted segment was lost, the trauma mechanism was avulsion, where the level of injury was zone 2 in eight patients and zone 3, in four patients. The final failure rate was 10 % (12 patients out of 120).

DISCUSSION

Classically, digit replantations have a specific indication for hospitalization to monitor the viability of the reimplanted segment and for general postoperative care.

The difficulty in obtaining beds for SUS patients motivated us to perform replantations without hospitalization. Initially, it was difficult for our team to

Fig. 7 – Thumb amputation, at the proximal phalanx level.

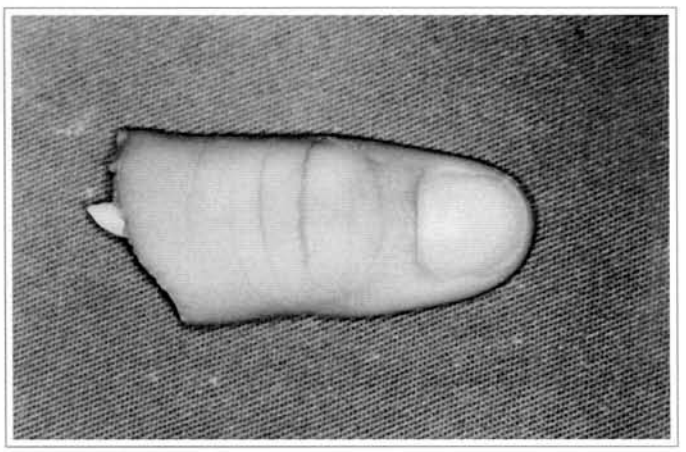

Fig. 8 – Amputated segment.

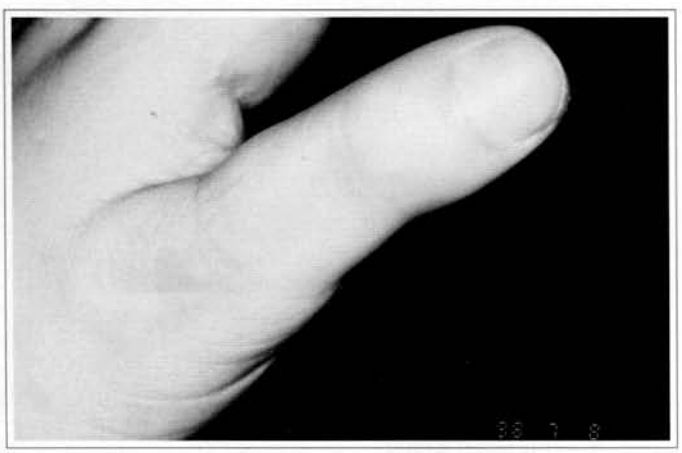

Fig. 9 – Final result.

Fig. 10 – Functional result.

adopt the procedure because of uncertainty of success and due to the anxiety of leaving the postoperative monitoring of the reimplanted segment exclusively to the patient. As our series grew, the procedure became as regular as others in our service.

We obtained a 90% (108 patients) success rate, which is close to that found in the literature and in our own service with hospitalized patients[4-8]. All cases with loss of the reimplanted segment were cases in which the injury mechanism was avulsion. The worst prognosis associated with this type of amputation or devascularization is well described in the literature[9,11,12]. The trauma mechanism was the major determinant of reimplantion success and not postoperative conditions (Figs. 7, 8, 9, 10).

Another relevant aspect observed in the study was the ability of patients to assess the presence of postoperative thrombosis. Re-intervention was necessary in 15 of the 20 patients that reported circulatory abnormality in the reimplanted segment.

In selected cases, single digit replantation has a series of advantages in comparison to other treatment methods. No secondary reconstruction procedure attains the functional and aesthetic result of a successfully reimplanted and rehabilitated finger[3,13,14]. Unfortunately, the shortage in SUS beds prevents many services from performing single digit amputation reimplantations, even in cases where replantation would be the first choice. We hope that the present study will encourage single digit replantation whenever indicated and we suggest that the lack of hospital beds is not a decisive factor in choosing the method of treatment of finger amputations and devascularizations.

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