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DIGITAL POST TRAUMATIC REPLANTATION: EXPERIENCE OF IBN SINA UNIVERSITY HOSPITAL

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ABSTRACT

Digital amputations are common. They are mainly due to work related accidents and they are a real case of replantation emergency which must obey to well-established rules. The development of microsurgery has increased the success rate of these interventions. In this article, we report on our experience with a retrospective study of 18 single-finger replantations performed over a period of seven years in the department of plastic and hand surgery, in Ibn Sina teaching hospital in Rabat. Despite the problems such as the delay of medical transport and lack of emergency equipment, 16 fingers have been successfully replanted with acceptable functional and aesthetic result.

Keywords: amputation; finger; replantation; outcome

INTRODUCTION

When a finger or a segment of a limb is completely or partially sectioned, it is sometimes possible to successfully reimplant it. It is always a long procedure, which consists of repairing successively all the anatomical elements. Over the last 50 years, advances in microsurgical technique, bone fixation, nerve repairing, and tendon repairing have allowed the salvage of amputated digits, hands, and limbs that would not have been recovered in previous times.
In this paper, we report on our experience in digital replantation in 18 patients for which we obtained successful outcomes despite some difficulties.

MATERIAL AND METHODS

This retrospective study conducted in the department of reparative and plastic surgery at the University Hospital of Rabat included 18 patients from January 2004 to January 2011.

Age, gender, localisation, level of amputation, type of trauma and ischemia time (in hours) have been studied (table I). The average age of the patients was 20, with male prevalence (12 patients - 66.66%).Traumatic mechanisms were divided between: net section by blunt object (8 patients - 45%) (Figure 1), avulsion (6 patients - 33%), and crushing (4 patients - 22%) (Figure 2). The average time of ischemia after trauma was higher than 24 hours in all cases.

Figure 1: net section of the finger, scarifying the distal tip shows a devascularized finger.

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Figure 2: Crushing finger (D2) with amputation.

Followed by the index finger, thumb was the most commonly affected.

All patients benefited from x ray radiographies and conservation of the amputated stump into the cold. Antibiotic treatment was started on the day of trauma and kept for 10 days; all patients were operated using axillary block anaesthesia, sometimes associated with sedation. One of the cases required that we perform a general anaesthesia (4 years old patient).

In all cases, the procedure was the following: trimming of the amputated stump, bone shortening, osteosynthesis by the crossed Kirschner wires and tendon repairing. The digital arteries were initially repaired followed by the two collateral nerves. In 7 cases, we repaired two dorsal veins and in 7 cases we repaired the Paronychial vein, a retro-ungueal incision was performed in cases when venous anastomoses were impossible. The distal fingertip remained exposed without dressing, so that its appearance is visible for the surgeon to detect an early stage of skin necrosis (Figure 3).

Figure 3: replantation of the finger using two Kirshner wires, and bleeding by the needle allowing its control.

All replanted fingers were immobilized by a plaster splint and were then kept warm. Postoperative analgesia and antiplatelet orally for fifteen days were systematically administered.

Table I: Clinical cases.

Case	Age (Years)	Gendre	finger amputated	Level of amputation		type of trauma	ischemia time (in hours)
1	19	M	D2	P1		net Section	24
2	22	M	thumb	P1		avulsion	35
3	16	F	thumb	P1		net Section	80
4	18	M	D2	P2		net Section	28
5	19	M	D3	P1		Crush	39
6	20	M	D2	DIP		Crush	40
7	4	M	D2	P2		Crush	28
8	23	M	thumb	P2		avulsion	37
9	24	M	thumb	P1		avulsion	46
10	28	M	thumb	P2		avulsion	37
11	20	F	D5	P1		net Section	35
12	22	F	D4	P1		net Section	40
13	18	F	D3	P3		avulsion	28
14	18	F	D2	P2		Crush	37
15	19	M	D2	P2		net Section	26
16	20	F	D3	P1		net Section	25
17	22	M	thumb	MP		net Section	29
18	50	M	thumb	MP		avulsion	31

M: Male. F: Female

D2: Index Finger. D3: Middle Finger. D4: Ring Finger. D5: Pinkly Finger.

DIP: distal Interphalangeal Joint. P1: Distal Phalange. P2: Intermediate Phalange. P3: Proximal Phalange. MP: Metacarpophalangeal Joint.

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RESULTS

During the first 24 hours after surgery, we have re-operated six patients because they had an arterial and / or venous thrombosis. Reintervention was followed by success in four patients. Despite our efforts, two cases failed (5 and 7). One amputation was done at a level that allowed primary closure, and the other patient underwent ray resection. In three other cases (16.66% of cases) we had a partial necrosis of pulp repaired by Venkataswami flap in first case, Hueston flap in the second case and by directed cicatrisation in the third case.

All patients were discharged from the hospital in less than 8 days.

The 16 successful cases were tracked over an average period of 24 months, one patient required secondary distal interphalangeal joint arthrodesis.

Outcome analysis included total active motion of all 3 joints, sensibility (evaluated using the Weber test), and cold intolerance. Despite the re-education, mobility was limited by a deficit of flexion of the metacarpophalangeal joints (gap palm pulp 2 to 4cm) in most of our patients. The extention deficit of metacarpophalangeal joints and proximal interphalangeal joints was between 0° and 20°; one (index) finger was crocheted; at the thumb, the clamp was possible in all patients. One patient developed painful neuroma of the medial side of the thumb which was treated later (case n°2). All patients have recovered normal sensitivity of their fingers, however, four of them complained of cold intolerance (cases n° 10, 11, 14 and 18).

DISCUSSION

Digital amputations continue to be a challenge for reconstructive surgeons [1].

These injuries are usually caused by crushing, shearing, and avulsing the soft tissue envelope of the finger [2], resulting in severe macroscopic and microscopic damage to the digital vessels and nerves [3]. The functional and aesthetic impact of the deformations caused by the digital amputation are considerable especially in female patients. Replantation is the only method that allows resuming normal activities by minimizing the double impact [4, 5]. It is technically challenging surgery with a high chance of failure, yet it can avoid painful neuroma formation or unacceptable cosmesis. The possibility of reimplanting an amputated finger has long fascinated surgeons [6]; In the 1960s, after Kleinert and Kasdan [7] reported the first digital artery repair, Komatsu and Tamai [8] replanted the first thumb, and the work was completed at the Sixth Shanghai People's Hospital [9], where replantation of amputated digits became a reality. Since then, microsurgery has evolved at a rapid pace. This intervention is generally long (3-6 hours) and usually needs a general anesthesia [10, 11]; the majority of our patients are operated under locoregional anesthesia optionally combined with sedation. 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 [12 –14]. Most hand surgeons would not advocate replanting single-finger amputations [15], especially in cases of complete degloving [16, 17], Even with a successful revascularization of the skin, there remains a risk of poor functional results [18] that may interfere with the overall functioning of the hand.

The mechanism of the injury (sharp object, crush, or avulsion), the level of injury (tip, relation to flexor digitorum superficialis, proximal interphalangeal joint involvement), and the skill of the surgeon are all recognized as playing an important role in the overall outcome and function of replanted digits [19–21]. In our series we had two failed cases (cases n° 5 and 7) which were both injured by a crushing mechanism. As for the functional results, they were influenced by the associated bone and tendon injuries thus justifying the importance of early re-education [22]. Range of motion, sensory recovery, and patient satisfaction all contribute to the overall outcome after replantation and should all be evaluated, in order for the evaluation to be more comprehensive and not to consider only the successful reestablishment of blood flow and digit viability. Financial pressures are having an increasingly high impact on discussions regarding outcomes after replantation because of the costs of the procedures and the required 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 [23].

CONCLUSION

Digital amputations are common and they are mainly due to work related accidents.

Microsurgical techniques represent an alternative to repair these amputations.

The management of this kind of patients is difficult in our health care system mainly because of the delay in transportation of the patients and the lack

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of microsurgical equipment in the emergency department. But this was made possible with the training of the surgical team, selecting patients and respect of the various steps of the surgical procedure.

Declarations

The authors declare that they have no conflict of interest.

REFERENCES

1. Brooks B, Buntic RF, Kind GM, Schott K, Buncke GM, Buncke HJ. Ring avulsion: injury pattern, treatment, and outcome.Clin Plast Surg.2007; 34(2):187–195.
2. Kupfer DM, Eaton C, Swanson S, McCarter MK, Gilbert WL. Ring avulsion injuries: a biomechanical study.J Hand Surg Am.1999; 24(6):1249 –1253.
3. Mitchell GM, Morrison WA, Papadopoulos A, O'Brien BM. A study of the extent and pathology of experimental avulsion injury in rabbit arteries and veins.Br J Plast Surg.1985; 38(2):278 –287.
4. Reid DA, McGrouther DA. In: Surgery of the thumb. Cambridge: Butterworths; 1986, p. 65-78.
5. Eger M, Scmidt B, Torok G, Khodadadi J. Replantation of upper extremities. Am J Surg 1974; 128: 447- 450
6. Manktelow RT, McKee NH. Digital replantation: a functional assessment. Can Journal Surg 1979; 22(1): 47-53.
7. Kleinert HE, Kasdan ML. Anastamosis of digital vessels. J Ky Med Assoc 1965; 63:106 –108.
8. Komatsu S, Tamai S. Successful replantation of a completely cut-off thumb. Plast Reconstr Surg 1968; 42:374 –377.
9. Chen CW, Chien YC, Pao YS, Lin CT. Reattachment of traumatic amputations, a summing up of experiences. Chin Med J (Engl) 1967;1:392-401.
10. Biemer E. The organisation of a central replantation centre. In: Brunelli G, editor. Textbook of Microsurgery. Milan: Masson; 1988, p. 467-70.
11. Chang TS. Principles, techniques and applications. In: Microsurgery. Singapore: World Scientific; 1986, p. 44-8.
12. Nissenbaum M. Class IIA ring avulsion injuries: an absolute indication for microvascular repair.J Hand Surg Am.1984; 9(6):810 – 815.
13. Weil DJ, Wood VE, Frykman GK. A new class of ring avulsion injuries. J Hand Surg Am.1989; 14(4):662– 664.
14. Davis Sears E, Chung KC. Replantation of finger avulsion injuries: a systematic review of survival and functional outcomes.J Hand Surg Am.2011; 36(4):686 – 694.
15. Urbaniak JR, Evans JP, Bright DS. Microvascular management of ring avulsion injuries.J Hand Surg Am.1981; 6(1):25–30.
16. Tsai TM, Manstein C, DuBou R, Wolff TW, Kutz JE, Kleinert HE. Primary microsurgical repair of ring avulsion amputation injuries. J Hand Surg Am.1984; 9(1):68 –72.
17. Chung KC. Invited discussion: long-term results of replantation for complete ring avulsion amputations. Ann Plast Surg.2003; 51(6): 569.
18. Pederson WC. Replantation.Plast Reconstr Surg.2001; 107(3):823– 841
19. Tamai S. Digit replantation. Analysis of 163 replantations in an 11 year period. Clin Plast Surg 1978; 5: 195–209.
20. Sabapathy SR, Venkatramani H, Bharathi RR, et al. Replantation surgery. J Hand Surg Am 2011; 36: 1104–10.
21. Maricevich M, Carlsen B, Mardini S, et al. Upper extremity and digital replantation. Hand (N Y) 2011; 6: 356–63.
22. Ozkan O, Ozgentas HE, Safak T, Dogan O. Unique superiority of microsurgical repair technique with its functional and aesthetic outcomes in ring avulsion injuries. J Plast Reconstr Aesthet Surg. 2006; 59(5):451– 459.
23. Reuben A. Bueno Jr, Bruno Battiston, Davide Ciclamini,and al. Replantation Current Concepts and Outcomes. Clin Plastic Surg 2014; 41:385–395