SAGE Open Medical Case Reports
1: 2050313X13511601

DOI: 10.1177/2050313X13511601
sco.sagepub.com
SAGE

Hand replantation: A rare case report

Magdy M El-Sayed Ahmed[1,2]

Abstract

We report a case of a hand replantation. A 43-year-old male presented with an amputated right hand. After clinical and radiological examination of the amputated hand and the forearm stump, the patient was consented for hand replantation procedure. Both bones of the forearm were fixed using K-wires. Careful dissection, trimming and repair of the tendons, vessels (two arteries and one vein) and nerves was achieved. The patient tolerated the procedure well and 2 months later showed a progressive improvement in motor and sensory functions. We suggest that a single-vein repair is sufficient for a successful hand replantation.

Keywords

Hand replantation, amputated hand, vein

Received: 6 August 2013; Accepted: 10 October 2013

Alexis Carrel, who won the Noble Prize in 1912 for his development of the vascular anastomosis technique, performed the first extremity replantation in a complete amputated canine hind limb in 1906.[1–3] Functional outcomes following replantation vary with the level of injury. Replants of the fingers distal to the flexor superficialis insertion, the hand at the wrist, and the upper extremity at the distal forearm can achieve good function.[4–6] Several authors have proposed a list of indications and contraindications for hand and digital replantation that are largely followed (Table)[7–10]

Case report

We report a 43-year-old male who presented with an amputated right hand (Figure 1). After clinical and radiological examination of the amputated hand and the stump, the patient was consented for hand replantation. Careful dissection and debridement of the neurovascular structures both proximally and distally and a 1-cm bone shortening of both bones on the amputated hand side was done. Afterward, both forearm bones were fixed by four K-wires. Meticulous repair of the radial and ulnar arteries and the cephalic vein was accomplished followed by repair of the three nerves of the forearm. Finally, tendons repair and skin closure was achieved. The patient tolerated the procedure well and 2 months later showed a progressive improvement in motor and sensory functions (Figure 2).

Discussion

The cephalic vein was the only vein repaired because the rest of the veins of the hand were either too small or badly damaged. While this replanted hand survived on a single-vein repair, Weiland described that a ratio of 2 veins to 1 artery repair is required to improve the outflow and increase the chances of the hand survival.[11] Also, other authors recommended to repair more than a single vein.[12,13] The cut end of the two bones on the amputated hand side was ragged and sharp so about 1 cm of the two bones was resected. Bone shortening facilitated the neurovascular structures repair without grafts. The distal radio-ulnar joint was about 3–4 cm away from the trauma site so integrity of the joint was preserved. Regarding the outcome of the sensory and motor function recovery, several reports have revealed favorable results following hand replantation, including of Hoang, who reported five consecutive hand replants in young male patients with clean-cut injuries at the level of radiocarpal joint resulting in 70%–80% of total active motion in the digits and thumb and 8–12 mm of static two-point discrimination.[14,15] The best results have been seen in children with the recovery of as much as 90% of total active motion and 5–7 mm of static two-point discrimination.[16] In our patient, the follow- up period is 2 months, so complete assessment of the sensory and motor function recovery is not feasible at this time period. However, the patient has started to exhibit flexion and extension movements at the wrist, metacarpophalangeal and interphalangeal

[1]Department of Cardiovascular Surgery, Texas Heart Institute, St. Luke's Episcopal Hospital, Houston, TX, USA
[2]Department of Surgery, Zagazig University Faculty of Medicine, Zagazig, Egypt

Corresponding author:
Magdy M El-Sayed Ahmed, Department of Cardiovascular Surgery, Texas Heart Institute, St. Luke's Episcopal Hospital, 6770 Bertner Avenue, Houston, TX 77030, USA.
Email: elgoharymagdy@yahoo.com

Table. Indications and contraindications for hand and digital replantation according to most authors [7–10].

Indications	Contraindications
Thumb amputation	Single digits proximal to the insertion of the flexor digitorum superficialis (Zone II)—particularly in the index or small fingers
Multiple digits	Severely crushed, avulsed or mangled parts
Hand amputation through palm	Multilevel amputation
Hand amputation (distal wrist)	Prolonged warm ischemia time
Any part in a child	Severely arteriosclerotic vessels
Finger distal to the insertion of the flexor digitorum superficialis tendon (Zone I)	Multiple trauma to other regions[a]
	Severe comorbidities[a]

[a]Relative contraindications.

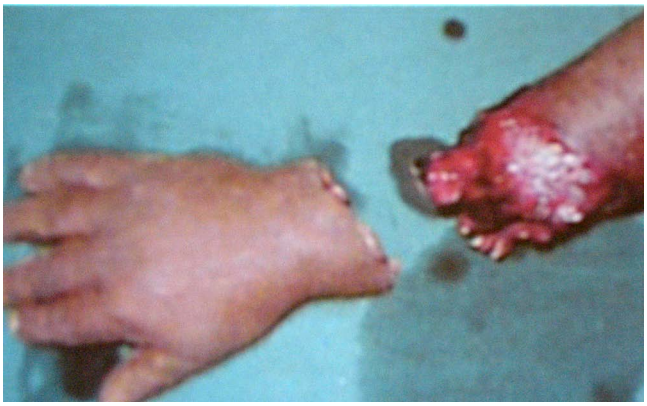

Figure 1. A photograph showing the amputated right hand.

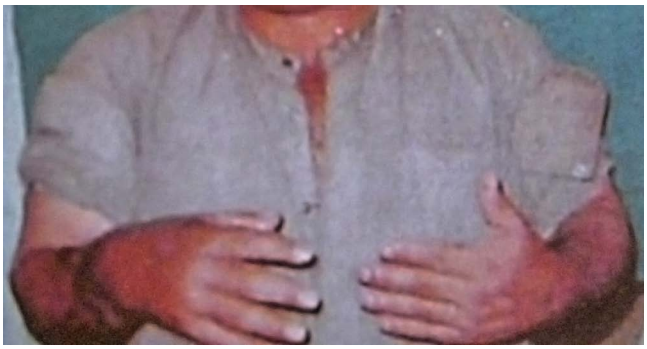

Figure 2. A photograph showing the attached right hand 2 months postoperatively.

joints and signs of initial sensory recovery, such as crude touch.

We conclude that in our procedure, single-vein repair was sufficient for survival of a replanted hand; however, we recommend utilizing more than a single-vein repair, if possible, for a better chance of survival of the hand.

Ethics

The Ethical Committee approval was sought for this article.

Declaration of conflicting interests

The author has no conflict of interest to disclose and no relationships to industry related to this research.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

1. Carrel A and Guthrie CC. Results of a replantation of a thigh. *Science* 1906; 23: 393–394.
2. Kocher MS. History of replantation: from miracle to microsurgery. *World J Surg* 1995; 19: 462–467.
3. Malt RA and McKhann C. Replantation of several arms. *JAMA* 1964; 189: 716–722.
4. May JW Jr, Toth BA and Gardner M. Digital replantation distal to the proximal interphalangeal joint. *J Hand Surg Am* 1982; 7: 161–166.
5. Russell RC, O'Brien BM, Morrison WA, et al. The late functional results of upper limb revascularization and replantation. *J Hand Surg Am* 1984; 9: 623–633.
6. Vanstraelen P, Papini RP, Sykes PJ, et al. The functional results of hand replantation. The Chepstow experience. *J Hand Surg Br* 1993; 18: 556–564.
7. Pederson WC. Replantation. *Plast Reconstr Surg* 2001; 107: 823–841.
8. Chang J and Jones N. Twelve simple maneuvers to optimize digital replantation and revascularization. *Tech Hand up Extrem Surg* 2004; 8: 161–166.
9. Bastidas N, Cassidy L, Hoffman L, et al. A single-institution experience of hand surgery litigation in a major replantation center. *Plast Reconstr Surg* 2011; 127: 284–292.
10. Soucacos PN. Indications and selection for digital amputation and replantation. *J Hand Surg Br* 2001; 26: 572–581.
11. Weiland AJ, Villarreal-Rios A and Kleinert HE. Replantation of digits and hands: analysis of surgical techniques and functional results in 71 patients with 86 replantation. *J Hand Surg Am* 1977; 2: 1–12.
12. Goldner RD and Urbaniak JR. Replantation. In: Wolfe SW, Hotchkiss RN, Pederson WC, et al. (eds) *Green's operative hand surgery*, vol. 2. 6th ed. Philadelphia, PA: Elsevier–Churchill Livingstone, 2011, pp. 1585–1601.

13. Jones NF. Replantation in the upper extremity. In: Thorne CH, Beasley RW, Aston SJ, et al. (eds) *Grabb & Smith's plastic surgery*. 6th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2007, pp. 868–883.
14. Garcia Julve JG. Digital amputation and their reconstruction: reconstructive surgery of the fingers. *Microsurgery* 1994; 15: 166–175.
15. Buchler U and Hastings HI. Combined injuries. In: Green D and Hotchkiss R (eds) *Operative hand surgery*. 3rd ed. New York: Elsevier–Churchill Livingstone, 1993 pp. 1563–1585.
16. Van Beek AL, Kutz JE and Zook EG. Importance of the ribbon sign, indicating unsuitability of the vessel, in replanting a finger. *Plast Reconstr Surg* 1978; 61: 32–35.