

Replantation of en-bloc amputation of all five toes: A very rare case

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ABSTRACT

Loss of all toes not only causes tremendous psychological impact but also causes a significant functional defect. There is no reported case of replantation of en bloc amputation of all five toes and very few papers on single or double toe replantations hence we had to rely on our experiences and logic to salvage the amputated part. Here, we report the case of replantation of en-bloc amputation of all five toes in a 16-year-old male. The purpose of this report is to share the authors' experience with en bloc toe replantation. Successful replantation goes a long way in mitigating the psychological and functional trauma of the patient.

Keywords: Amputation, En Bloc toe replantation, Microsurgery.

En bloc multiple toe amputation is a devastating injury both for the patient and his family resulting in not only functional impairment but also tremendous psychological trauma. The crushing element involved in the accident makes usual techniques in replantation unsuitable. There is no publication describing replantation in en bloc amputation of all five toes in the literature and very few publications of successful toe replant [1-4]. Hence, new ideas and methods had to be evolved to tackle this problem. We report the case of replantation of en-bloc amputation of all five toes in a 16-year-old male.

CASE REPORT

A 16-year-old male came to the department with en bloc amputation of all the toes at the metatarsophalangeal joint level on 15th April 2011 (Fig. 1). His foot had accidentally gone in the wheel of a running motorcycle during a collision of two motorcycles. He was taken to the local hospital where the part was preserved properly and sent to our institute.

On examination, the vitals were stable. The warm ischaemia time was 1 hour and the cold ischemia time was around 2 hours. The patient was assessed for concomitant injuries. The amputated part was assessed and as the en bloc amputation of all five toes was due to crush avulsion type of injury, there was extensive damage to the vessels and the local tissues at the site of amputation. The amputated stump also showed extensive crushing of the tissues and the vessels in the zone of amputation. But despite the crushed and degloving nature of the injury, it was decided that an attempt be made to replant the toes.

The patient was resuscitated and the part sent to the OR for dissection and tagging of the neurovascular structures. K wires were passed in the toe phalanges for fixation. The patient was

anesthetised and the wound explored. The dorsal digital arch was found to be avulsed and injured. Thus the dorsalis pedis artery was identified just distal to the branch to the plantar arch. Dorsal veins were identified, dissected and tagged. Both dorsal and plantar digital nerves were dissected and tagged. A Y-shaped vein graft was harvested from the opposite side foot. Sural nerve graft was harvested from the opposite leg.

The distal part was then fixed to the stump with K wires across the metatarsophalangeal joints. Then the vascular anastomosis was started with anastomosis of the dorsalis pedis artery with the common digital arteries of the first and second web spaces with a Y shaped vein graft using 10-0 nylon under the microscope. The toes pinked up and venous return was noted. Four dorsal veins were anastomosed with the use of vein grafts with 10-0 nylon under the microscope. Dorsal and plantar digital nerves were co-opted with 10-0 nylon under a microscope with nerve grafts.

Postoperatively, the patient was observed in the microsurgical ICU for five days. The fifth toe showed ischemic changes. Heparin and dextran were given for five days. The fifth toe was allowed to separate following dry gangrene. The resultant wound was



Figure 1: Preoperative picture of the (a) amputated part and (b) amputated stump



Figure 2: Four months postoperative picture showing well vascularized toes and healed wound

dressed and covered with split-thickness skin graft. The patient was mobilised on a walker after two weeks and was started on gradual weight bearing on the heels from the third week. The K wires were removed after 8 weeks. The patient developed a normal gait and has attained the full protective sensation of the toes at 4 months. He is able to wear normal footwear and is fully satisfied with the outcome (Fig. 2).

DISCUSSION

Replantation of the composite distal parts prove to be a daunting challenge and is made more difficult if there is an associated crush element to the injury. Toe amputations are seldom taken up for replantation due to fear of impending failure. The overall survival rate even when attempted is quite low and the main cause of failure is seen as arterial insufficiency due to vasospasm in these small vessels [4]. When the great toe amputation is associated with injury to lateral toes the survival rate drastically reduces [4]. This makes replantation of en bloc amputation of toes very difficult and rare. There have been reports of successful replantation of en bloc amputation of two and three toes [5,6] but no report of successful replantation of en bloc amputation of all five toes till date.

The crushing and degloving nature of the accident meant that both the proximal stump vessels and distal part vessels were in the zone of injury and not suitable for anastomosis. The dorsal digital arch was also disrupted and not usable. It was then decided to adopt a novel method using a Y-shaped vein graft connecting the dorsalis pedis artery to the common digital arteries of the first and second web spaces (Fig. 3). It was hypothesized that the 4th and possibly the fifth toe will get its blood supply through the connections between the arteries of the third, fourth and fifth toes. Multiple dorsal veins and both dorsal and plantar digital nerves were also connected using grafts.

Conventional techniques do not provide an answer to these challenging problems. The small vessel calibre at the amputation site and also the fact that the vessels are in the zone of injury makes them unsuitable for anastomosis primarily. The use of vein

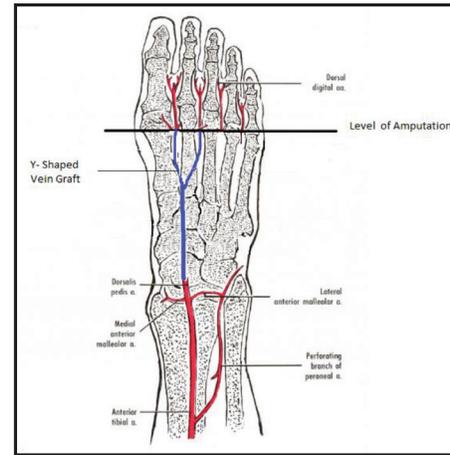


Figure 3: Diagrammatic representation of the Y-shaped vein graft used in the replantation

grafts to connect a distant vascular source to the amputated part and also using the unique arterial continuity between adjacent toes helps to solve this seemingly insurmountable problem. The dorsalis pedis artery near the origin is away from the zone of injury and is less prone to vasospasm as compared to the digital arteries of the toes. Hence, using a vein graft to connect the dorsalis pedis artery to the digital arteries in the distal amputated part provides for a much more reliable vascular supply to the replanted part. The use of a Y shaped vein graft to connect two common digital arteries using a single source helps to vascularise the entire en bloc amputated five toes. Multiple venous anastomoses should be done to prevent venous congestion. It is possible to salvage en bloc amputation of all five toes with proper planning and execution.

CONCLUSION

Replantation of distal parts should always be attempted and can give good results alleviating the patient of the psychological trauma of losing all his toes.

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