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CASE REPORT

Thumb dorsal skin composite tissue replantation: A case report

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ABSTRACT

The primary goal is to preserve thumb integrity and functionality to the greatest extent possible, even in cases involving very small amputated parts. In this article, we present a case in whom the seemingly non-replantable dorsal skin-nail composite tissue of the thumb could be successfully replanted with a single artery anastomosis. No additional procedures were required, and complete recovery was achieved. In conclusion, given the unique vascular structure of the thumb, all amputated parts should be carefully evaluated for replantation. Replanting a partially amputated finger yields superior functional and cosmetic outcomes compared to any reconstructive method.

Keywords: Composite tissue replantation, microsurgery, thumb, thumb arteries.

The thumb's opposition ability is crucial for the hand to function properly. Therefore, it is particularly important to protect the thumb in cases of hand injuries. Similar to the other fingers, the thumb has a pair of arteries: the dominant palmar digital arteries and the dorsal digital arteries.

Total or partial tissue replantation provides superior cosmetic and functional outcomes compared to other reconstruction methods.[1,2] Anastomoses to vessels with a diameter less than 0.8 mm fall under the category of supermicrosurgery.[3] While the risk of failure is high in anastomoses to vessels of this size, advances in microsurgical techniques and equipment have expanded the possibilities for anastomosis with very small vessels.

In this article, we present a case in whom tissue losses in the thumb could be successfully replanted using supermicrosurgical methods, even for very small pieces.

CASE REPORT

A 62-year-old male patient was admitted to the emergency department with a saw injury to the dorsal aspect of his left thumb (Figure 1). Upon examination, it was observed that the tissue from the dorsal part of the thumb, including the distal interphalangeal joint capsule and dorsal skin, nail, and nail bed, had been amputated. The extensor pollicis longus tendon was largely intact, but there was a tuft fracture in the distal phalanx (Figure 2). The amputated part (3×1 cm) was brought in with the patient. Following initial emergency room intervention, surgical preparation was made for a first dorsal metacarpal artery (FDMA) island flap.

An axillary block was performed, and the patient was taken into surgery three hours after the injury. Initially, the tuft fracture was stabilized with a 1.2-mm diameter Kirschner wire (K-wire). Subsequently, wound site debridement was carried out, revealing pulsatile bleeding from the ulnodorsal digital artery. During this stage, the amputated part was microscopically assessed. Following debridement,

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a suitable ulnar-side artery for anastomosis and a single digital nerve for coaptation were identified. Unfortunately, no suitable vein for anastomosis was found. The arterial anastomosis was performed using 10.0 monofilament suture under a microscope, followed by digital nerve coaptation. After anastomosis, there was adequate blood supply to the replanted composite tissue. Loose sutures were applied for fixation, and the surgery was concluded.

Postoperatively, the patient received antibiotics, non-steroidal anti-inflammatory drugs (NSAIDs), and 100 mg/day of acetylsalicylic acid. There were no postoperative complications, and the patient's finger was maintained in an elevated position above heart level for one week. The first dressing was applied on postoperative Day 3, and the patient exhibited continued vitality in the replanted composite tissue during follow-up.

On postoperative Day 6, the patient was prescribed acetylsalicylic acid (100 mg/day) and discharged. The patient had no additional comorbidities such as diabetes, hypertension or smoking. Weekly outpatient clinic visits confirmed the viability of the composite tissue, with no signs of marginal necrosis (Figure 3). The patient's sutures were removed at three weeks, and the K-wire was removed at six weeks (Figure 4). No pain was observed during thumb palpation. Joint range of motion exercises were explained to the patient and no activity restrictions were made.

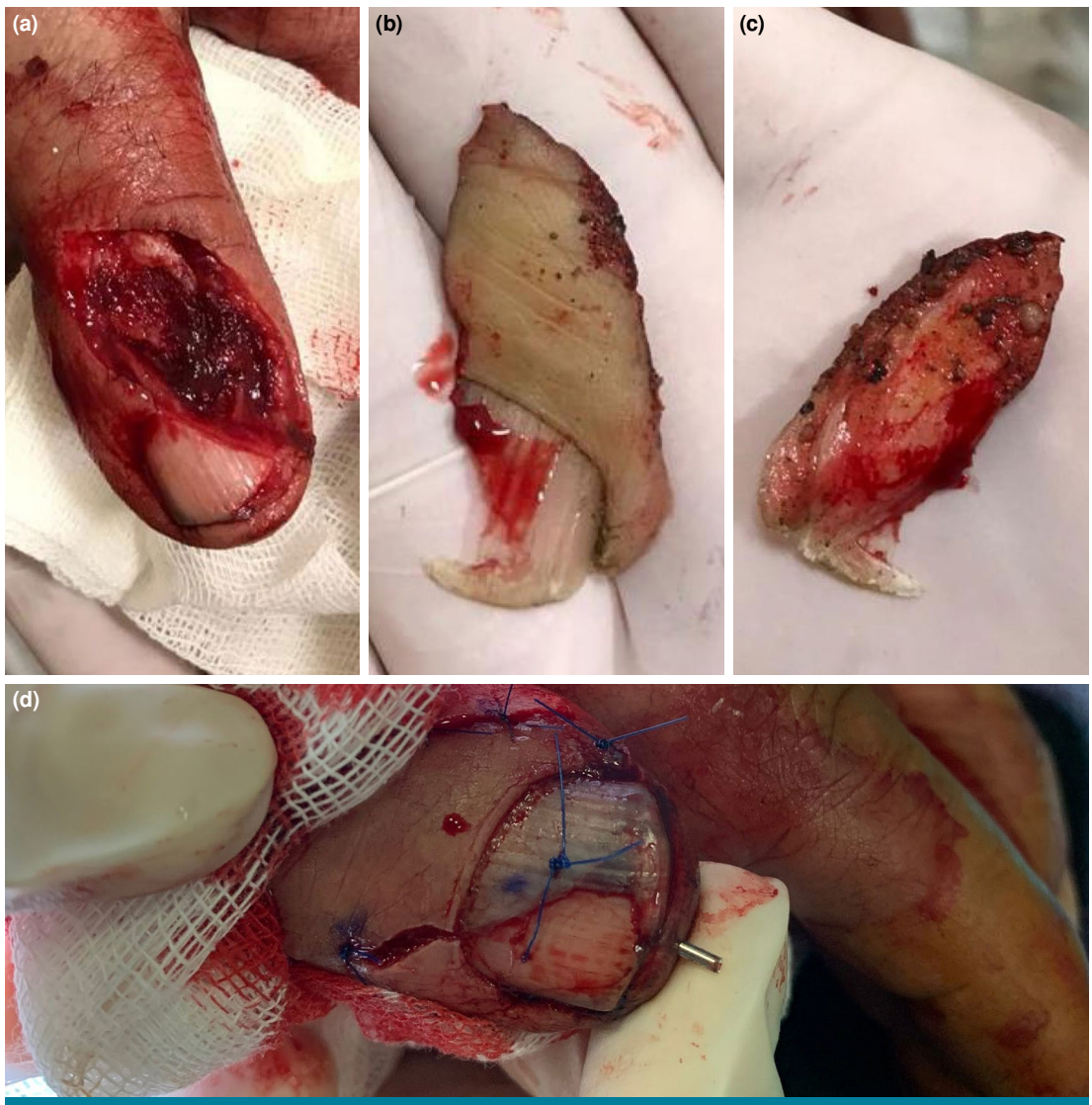

FIGURE 1. (a-c) View of the amputated part and the injury site, **(d)** blood supply seen after arterial anastomosis.

FIGURE 2. Preoperative X-ray of the left thumb.

FIGURE 3. Images of postoperative **(a)** Day 10 and **(b)** Week 5.

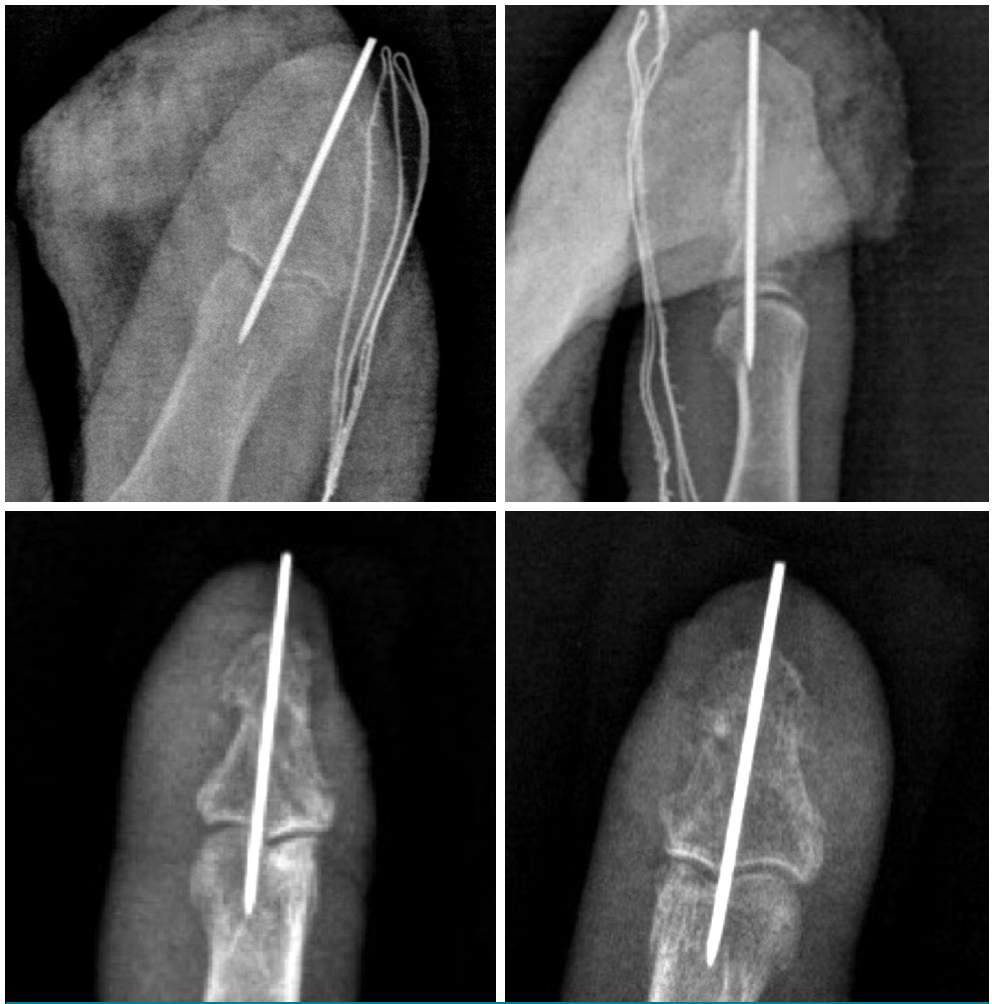

FIGURE 4. Postoperative and Week 6 X-ray of the left thumb.

DISCUSSION

The present case report demonstrated that a very small-sized amputation material could be replanted due to the unique vascular anatomy of the thumb. It should be noted that, even in such small tissue losses, there could always be a donor artery of appropriate size for anastomosis.[4]

There is a limited number of data in the literature on this subject. In the largest case series, the authors performed 24 composite tissue replantations in fingers, with three involving finger dorsal tissue. Notably, thumb replantations were not conducted in this study. Due to the absence of a suitable dorsal digital artery for anastomosis in these cases, they arterialized the dorsal central vein with the palmar digital artery. In one of the cases discussed, the study described the replantation of the nail bed complex through anastomosis with the distal artery arch.[5] However, in the present specific case report, the ulnodorsal digital artery of the thumb was deemed suitable for anastomosis, and an arterioarterial anastomosis was performed.

An autopsy study reported palmar digital arteries in over 99% of cases.[6] The mean diameter of the ulnopalmar digital artery was 1.1 mm, while the radiopalmar digital artery had a mean diameter of 0.81 mm. The ulnodorsal digital artery, on the other hand, had a 0.61 mm diameter and was found in 83% of cases. The radiodorsal digital artery was present in 70% of cases with a diameter of 0.4 mm, making it the weakest artery in the thumb.[6] A systematic review of thumb arterial supply confirmed the presence of the ulnodorsal digital artery in 83% and the radiodorsal digital artery in 70% of cases.[7] While selecting the thumb dorsal arteries as donor vessels, opting for the ulnodorsal artery can facilitate anastomosis, as in this current report.

A cadaver study investigated whether the dorsal digital arteries of the thumb were sufficient to supply blood to the entire thumb skin, concluding that the dorsal vascular network could replace skin vascularization in over 90% of cases when the proper digital arteries of the thumb are ligated.[8] In the present case, the theoretical adequacy of the ulnodorsal digital artery was supported by the survival of the replanted tissue in the postoperative period.

In the literature, it is well-documented that successful outcomes can be achieved with a single artery anastomosis when a suitable vein cannot be found.[9,10] Smaller replanted tissues are less prone to venous congestion issues. In a study, Tamai zone 1 fingertip replantations with no external bleeding application achieved a success rate of 93%.[11] In the present case, a successful result was achieved by performing a single artery anastomosis. For digits and smaller tissues, the warm ischemia time is recommended as 12 h and the cold ischemia time as 24 h.[12] In our case, the warm ischemia time was 3 h and replantation was performed within the recommended timeframe.

In conclusion, several reconstruction options, such as FDMA flap and Brunelli/Moschella flap, were also available in our case. However, factors such as donor site morbidity and flap compatibility should be considered. Therefore, the primary choice for the reconstruction of all amputated parts should be replantation, if feasible.

Patient Consent for Publication: A written informed consent was obtained from the patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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