Case report

Anterolateral thigh free flap for simultaneous reconstruction of digital extensor tendon and defect of the dorsal hand: A case report

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ABSTRACT

This paper describes a new technique in the repair of the hand defect with digital extensor tendon injury. The anterolateral thigh flap with the thick femoral fascia has been used in the reconstruction of the composite defect of the dorsal hand, especially the defect of tendon. This technique requires short period of treatment and hence causes less damage to the donor site but shows a better recovery of the hand function. A favorable curative effect has been obtained in this patient.

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Introduction

The functional repair and reconstruction of composite tissue defect of the hand has always been a challenge in hand surgery. Traditional operation method requires staged surgery, which is comparatively longer in treatment cycle and poorer in curative effect. For composite tissue defect of the dorsal hand with digital extensor tendon injury, the application of anterolateral thigh free flap in the simultaneous reconstruction may receive a favorable clinical outcome. Our hospital adopted this technique in the repair of the hand defect with digital extensor tendon injury in one case, and favorable curative effect has been obtained. It is reported as follows.

Case report

A 21-year-old male patient presented at our hospital with dorsal hand contusion. The wound area was about 5 cm × 9 cm, combined with a 2.5 cm defect of the index digital extensor tendon. The extensor digitorum communis (EDC) and the extensor indicis proprius (EIP) of the index finger incurred tendon rupture and a 1 cm defect of the middle digital extensor tendon (Fig. 1).

On admission, the patient received one-stage operation of free flap transplant. After successful general anesthesia, thorough debridement was performed to remove devitalized and contaminated tissues. The degree of tissue defect was measured for both length and scale, marking the arteries, veins and nerves. After complete hemostasis of the wound, the precondition for flap transplant was ready.

Flap design

The line connecting the anterior superior iliac spine and the lateral superior border of the patella was considered as the axis. The skin perforator of the descending branch of lateral circumflex femoral artery was detected using the color Doppler flow imaging; and the flap was designed according to the defect but 1 cm wider in diameter.

Flap preparation

The flap preparation started from the lateral side. The subcutaneous tissue was interruptedly sutured to the femoral fascia to protect the vascular network of the flap. The flap was lifted to identify the cutaneous feeding branches, and the superior border of the flap was cut open for the descending branch of the lateral circumflex femoral artery; and then the flap was dissociated. On pedicle division, the flap was sutured to the defect with the femoral fascia bridging the two broken ends of the extensor tendon of the index finger (both...
tendons of EDC and EIP of the index fingers) and the middle finger (Fig. 2).

Bridging method

After the proximal and distal ends of the extensor tendon were straightened up, the index finger was placed at extending position; the femoral fascia was then flattened and adjusted to the two broken ends which were sutured to the femoral fascia with proper tension of the tendon. Then, the broken ends were wrapped up with enhanced suture of the femoral fascia covering 1 cm in each. The radial artery and vein as well as dorsal digital nerves were exposed at the snuff-box region and connected with the artery and vein of the flap using the end-to-end anastomosis. Neuro-anastomosis was also performed to connect the lateral femoral and dorsal hand cutaneous nerves in order to restore part of the superficial sensation. The donor site was sutured directly.

After operation, the affected hand was placed at an extending position for 3 weeks with a plaster external fixation. During this period, the blood circulation of the flap was closely monitored. Conventional treatments included promotion of blood circulation, detumescence and analgesia. Two months after operation, the dorsal hand was bloated, indicating unfavorable movement of the index finger (Fig. 3). So a second stage operation was performed to cut the flap thin and release the tendon. The surgery was performed under brachial plexus anesthesia, in which an incision was made at the border of the flap that was then dissociated from the surface of the femoral fascia, releasing the femoral fascia and the tendon from the surrounding tissues. After dissociation from the flap, the bridged tendon was trimmed according to its natural morphology. On the first day after operation, the patient was encouraged to start functional exercise as early as possible, including active and passive flexion and extension of the index finger. Six months after injury, the metacarpophalangeal joint of the left index finger could achieve an extension of 0°, flexion 60°; and the proximal interphalangeal joint could also reach an extension of 0°, flexion 30°. The sensation of the dorsal flap was impaired compared to the surrounding skin.

Discussion

Common methods to treat dorsal hand composite tissue defect with extensor tendon injury are: (1) Reconstruction using compound instep flap: Its major drawback is the comparatively larger defect of the donor site; and if the extensor tendon of the finger was used, it would easily result in hammer-finger deformity, not to mention the requirement of skin grafting for the donor site, which would greatly affect the function of the hand.1 (2) A two-staged operation: Such methods include many surgical sites; and due to a period of immobilization after tendon transplantation, it is easy to incur adhesions of the already transplanted tendon to the surrounding tissues. Fortunately, the anterolateral thigh flap, with the thick femoral fascia, could be used in the reconstruction of the composite defect of the dorsal hand, especially the defect of tendon, which requires shorter period of treatment and hence causes less damage to the donor site but shows a better recovery of the hand function.

The femoral fascia wrapping around the tendon defect should not be trimmed as the tendon’s natural morphology at the first-stage operation so that it would not undergo avascular necrosis. In this case, the release of femoral fascia and tendon was performed 2 months after the flap transplantation, in which the femoral fascia between the proximal and distal ends of the extensor tendon of the index finger was trimmed according to the tendon’s natural morphology.2

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