

Reconstruction of Finger Contracture with an Expanded First Dorsal Metacarpal Artery Perforator Flap



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Introduction

Free flaps are used when soft tissue defects in the finger cannot be closed with locoregional flaps. However, the thickness of the free flaps may impair the function and aesthetics of the hand. The first dorsal metacarpal artery perforator (DMCAP) flap is frequently used to cover bones, tendons, and neurovascular structures in the hand after trauma and burns as an alternative to grafts and free flaps. This study will present a case in which finger contracture reconstruction was performed with an expanded first DMCAP flap after an electrical burn.

Case Report

A 9-year-old male patient applied to our clinic with the complaint of inability to open the second finger of the left hand after an electrical burn. Physical examination revealed distal interphalangeal (DIP) and proximal interphalangeal (PIP) joint contractures. Reconstruction was planned for the patient with a Two-session expanded first DMCAP flap. In the first session, under general anesthesia, a tissue expander area of 5x3 cm, reaching the second metacarpal level from the dorsum of the hand, was marked. The skin and subcutaneous tissues were passed through a 3 cm vertical incision at the fifth metacarpal level. The area marked with sharp and blunt dissection was prepared for tissue expander while preserving the paratenon and periosteum. A 16 ml 5x3 cm tissue expander was placed in the prepared area from the vertical incision. The tissue expander was inflated with 4 ml of isotonic solution. The incision line was sutured, and the surgery was terminated. The tissue expander was inflated from the second post-op week with 1 ml of isotonic three days a week. The DMCAP area was enlarged six weeks later by giving 22 ml of isotonic solution. In the second session, the contracture at the left-hand second finger DIP and PIP level were excised under general anesthesia and tourniquet. Adhesions in the DIP and PIP joint capsules were opened. The left-hand second finger was fixed with Kirschner wire reaching the metacarpal joint distal to the finger. The 9x3cm DMCAP flap area was marked, previously expanded to the 6x2cm defect area on the left hand second finger. The planned area was incised proximally to reach the fascia of the first dorsal interosseus muscle. The first dorsal metacarpal artery was reached by carefully separating the muscle fibers from the fascia. After the pedicle dissection was completed, the 9x3 cm DMCAP flap was elevated by dissection over the paratenon. With 180 degrees rotation, the left-hand second finger was adapted to the 6x2 cm defect area on the volar face. The flap donor site was closed primarily (**Figure 1**). The operation was terminated by placing the hand on a protective splint. There were no complications in the flap in the post-operative period. The Kirschner wire was removed at six weeks postoperatively. The patient was referred to the physical therapy and rehabilitation department (**Figure 2**).

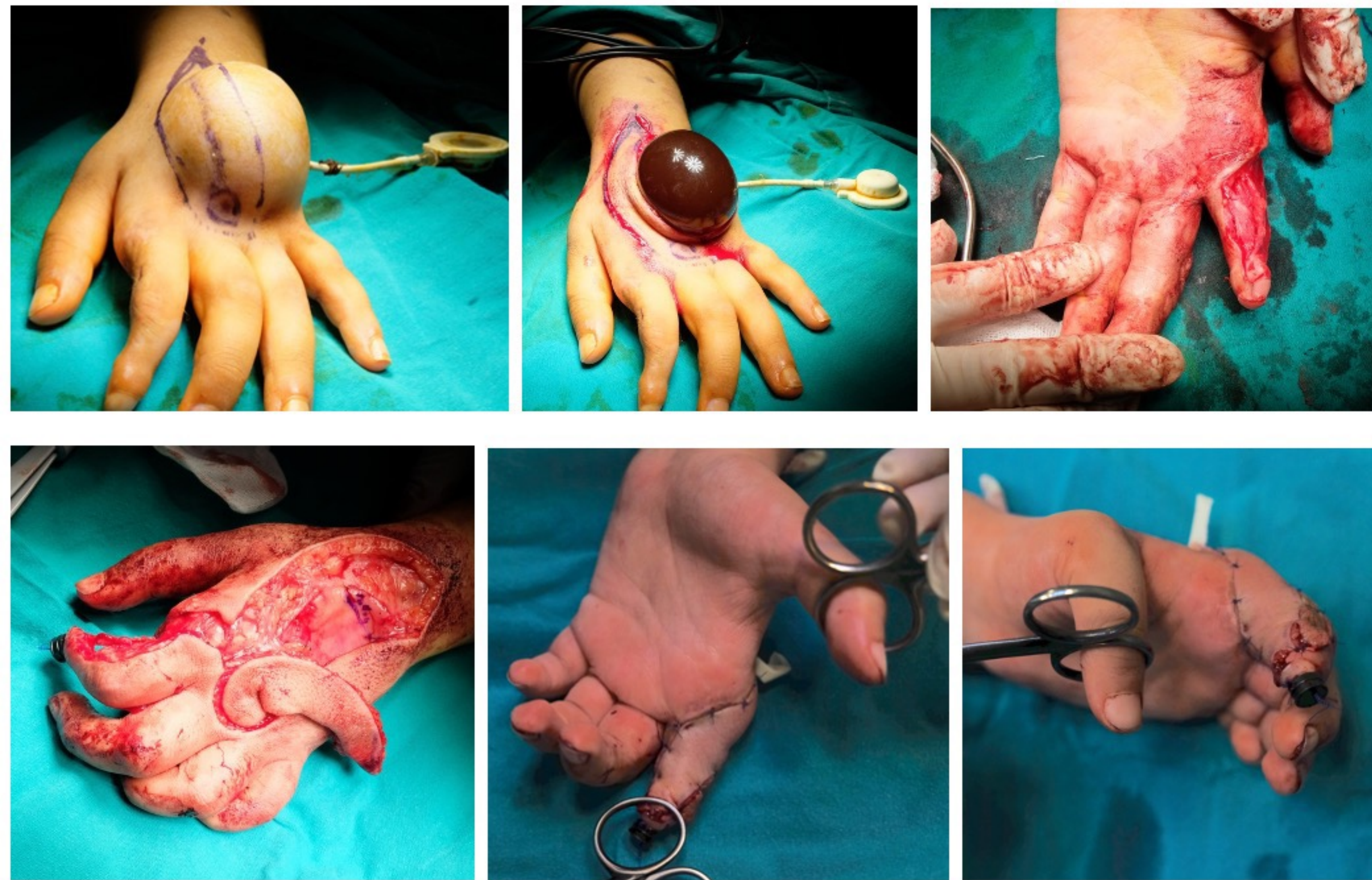


Figure 1: Explantation of expanded DMCA flap, scar contracture release, and transposition of the flap to contracture defect at the second finger volar site.

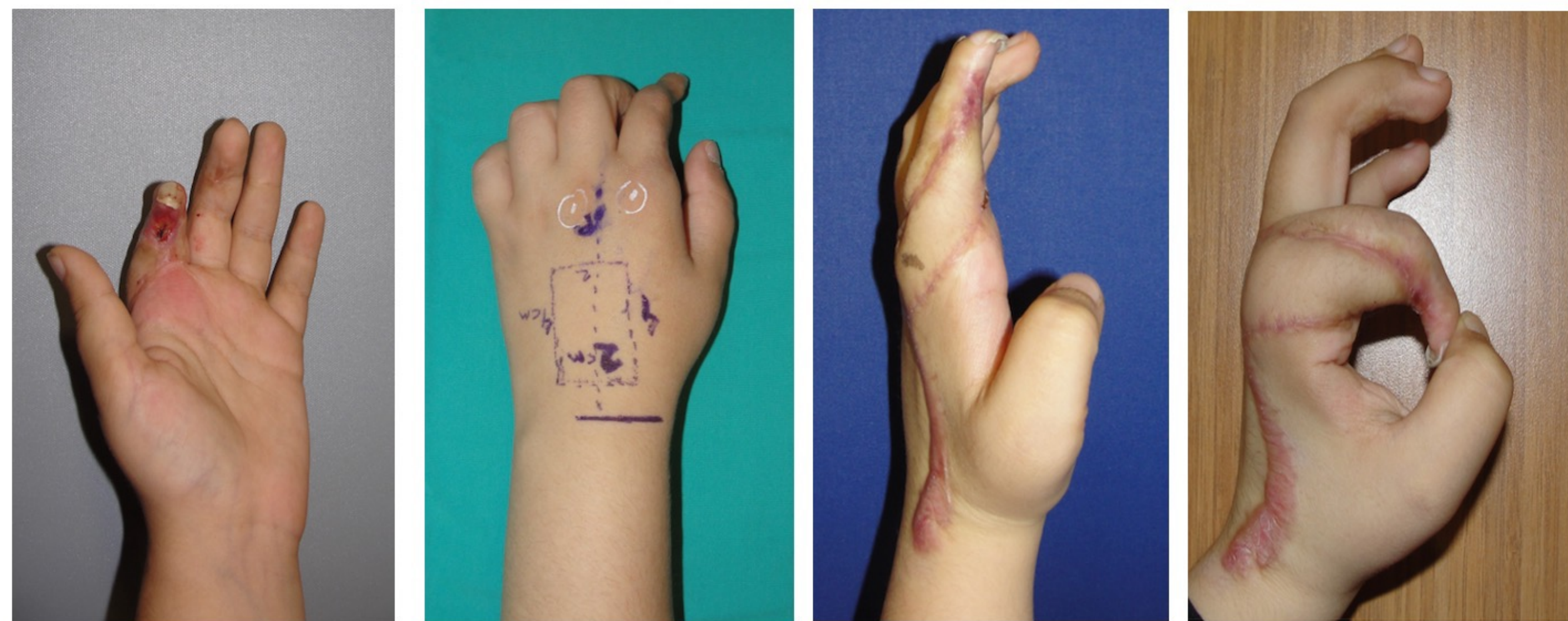


Figure 2: Preoperative image of the patient on the right. The plan of the expander placement. Post-operative first year image and the functional gain of the finger.

Discussion

This is the first case in the literature where finger contracture reconstruction was performed with an expanded DMCAP flap. Unfortunately, free flap surgery becomes difficult due to damage to the arterial and venous system in the acute period after electrical burns. Therefore, safer locoregional flaps should be preferred. However, in cases where the tissue defect cannot be closed with locoregional flaps, extra tissue can be provided using tissue expanders. In addition, primary closure of the donor area, appropriate flap thickness for the finger, and aesthetically pleasing results are the advantages of the expanded DMCA flap. However, the patient should be followed closely in tissue expander applications in the upper extremity, and pain and finger circulation should be constantly questioned.