

# Reconstruction of a Burn Sequel of the Hand With Long-Narrow Free Radial Forearm Flap

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## ABSTRACT

**Skin grafting may not always be possible for deep burns of the hand, due to possible exposure of tendons and bones. Although planning and use of free flaps is easier when used to cover broad defects, reconstruction of long and narrow defects is challenging. Here, we describe a patient with severe burns to his right hand who underwent reconstruction of his hand with a long narrow free radial forearm flap in a one-stage reconstruction.**

**KEY WORDS:** *Extremity burn, Free flap, Hand reconstruction*

## INTRODUCTION

The hand is the most affected site in burns, and management is typically determined by the depth of the burn.<sup>1</sup> The dorsum of the hand has a pliable and thin skin texture. Thus, tendons and bones are prone to exposure in deep dermal burns.<sup>2</sup> Skin grafting may not be possible when paratenon and periosteum are lost. Acute reconstruction of deep hand burns depends on the location and size of the burn injury. Local, regional, tubed, or free flaps can cover exposed neurovascular and bony structures.<sup>2</sup>

Although flap planning is easier when used to cover broad defects, reconstruction of long and narrow defects is challenging. Therefore, the general strategy is to cover the defect with a free flap and debulk the flap at a later stage.<sup>3</sup> Here, we describe a patient with a severe hand burn who underwent one-stage reconstruction of the hand with a long narrow free radial forearm flap (FRFF).

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**ACKNOWLEDGEMENTS:** The authors have not received any funding or grants in support of the presented research or for the preparation of this work and have no declarations of potential conflicts of interest.

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Burn Care and Prevention 2021/4: 206-208

## CASE REPORT

A 72-year-old otherwise healthy man presented to the Baskent University Burn Unit with a fire burn injury of his right hand. His right hand was severely burned while he was trying to extinguish a fire that started from the curtains of his house. A physical examination showed second- to third-degree burns in the dorsum of the right hand (Figure 1). The patient was hospitalized and started daily wound care with silver sulfadiazine. Eschar was debrided during the first week of hospitalization. After debridement, tendons of extensor pollicis longus, extensor indicis proprius, and the radial side of the dorsum of the hand were exposed. A serratus anterior free fascia flap (SAFFF) and skin grafting were performed to cover wide skin defects (Figure 2).

As a complication, partial necrosis of the flap developed. The distal phalanx of the index finger, second metacarpophalangeal joint, and second metacarpal corpus were exposed. A FRFF of 3 cm in width and 20 cm in length was elevated just over the radial artery and vein pedicle from the contralateral side. The donor site was closed primarily.

**FIGURE 1.** Patient's Hand Early After Injury and Exposed Tendons After Debridement

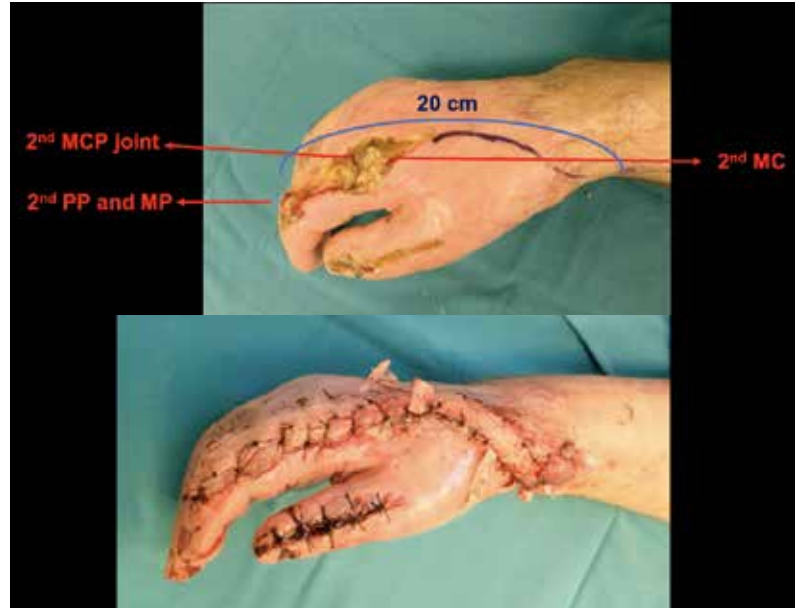


**Abbreviations:** EIP, extensor indicis proprius; EPL, extensor pollicis longus (Left) Image of the patient at first physical examination. (Right) Exposed tendons after the first debridement.

**FIGURE 2.** Coverage of Defect With Free Serratus Anterior Fascia Flap



**FIGURE 3.** Reconstruction of the Long Narrow Defect With Same-Width Free Radial Forearm Flap



**Abbreviations:** MC, metacarpal; MCP, metacarpophalangeal; MP, middle phalanx; PP, proximal phalanx

The anastomosis was performed in an end-to-side fashion to radial artery and concomitant vein.

The flap was anastomosed to the radial artery and concomitant vein in an end-to-side fashion (Figure 3). No early or late complications were encountered. The patient was referred to physical therapy to overcome joint stiffness and contractures.

## DISCUSSION

Extensor tendons lay superficially in the hand dorsum, and exposition is not rare for deep dermal burns of the hand. Flap reconstruction is preferred over skin grafting to overcome tendon adhesions, contractures, and the loss of paratenon or periosteum.<sup>4</sup> With advancements in technology and microsurgical techniques, free vascularized tissues have been increasingly used in burn patients.<sup>5</sup> For reconstruction of the dorsum of the hand, fascial flaps provide thin and pliable coverage.<sup>5,6</sup> In our patient, we preferred a SAFFF procedure for the first reconstruction. The SAFFF allows a thin, pliable, well-vascularized tissue with a gliding surface for the extensor tendon course.<sup>6</sup> In addition, the SAFFF can be combined with vascularized scapular bone for dorsal hand and phalangeal defects.<sup>7</sup> In our patient, the SAFFF developed partial necrosis. Narrow and long defects at the dorsum of the index finger and second metacarpal remained after debridement of the necrosis.

Flap options for hand dorsum include contralateral radial forearm flap, anterolateral thigh fascial or fasciocutaneous flaps, lateral arm fascia flaps, gracilis flap with a skin graft, scapular fascial or fasciocutaneous flaps, dorsal thoracic

fascia flaps, and deep inferior epigastric artery perforator flaps.<sup>4</sup> However, most flap options, such as anterolateral thigh flap and deep inferior epigastric artery perforator flap, are bulky and need secondary procedures for thinning the flap.<sup>4,8</sup> On the other hand, a contralateral FRFF has thin, pliable, and reliable options to cover defects of the hand dorsum. In our case, we preferred FRFF because it has a long pedicle length of up to 20 cm to cover exposed bones. The main drawback of contralateral FRFF is sacrificing a major artery of the contralateral arm.<sup>9</sup>

## CONCLUSIONS

A FRFF can be used for long and narrow skin defects with tendon or bone exposure after deep dermal burns.

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