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Groin Flap Experience in the Reconstruction of Soft Tissue Defects of the Hand

Serdar Yüce[1], Mustafa Öksüz[1], Muhammet Eren Ersöz[1], Ömer Faruk Koçak[1], Ahmet Kahraman[2], Dağhan Işık[3], Bekir Atik[4]

[1]Department of Plastic, Reconstructive, and Aesthetic Surgery, Yüzüncü Yıl University School of Medicine, Van, Turkey
[2]Department of Plastic, Reconstructive, and Aesthetic Surgery, Mustafa Kemal University School of Medicine, Hatay, Turkey
[3]Department of Plastic, Reconstructive, and Aesthetic Surgery, Katip Çelebi University School of Medicine, İzmir, Turkey
[4]Department of Plastic, Reconstructive, and Aesthetic Surgery, Medeniyet University School of Medicine, İstanbul, Turkey

Abstract

Objective: Pediculated groin flap has been playing an important role in hand reconstructive surgery for a long time. In this study, the cases where pediculated groin flap in the reconstruction of soft tissue defects of the hand was used are presented in terms of literature.

Material and Methods: The cases included in the study where a groin flap was used for hand defects between 2010 and 2014 in the Plastic, Reconstructive, and Aesthetic Surgery Department. The age, gender, reason of defect, its localization, groin flap size, donor area closure method, flap separation time, other treatments, and complications were thoroughly examined.

Results: Twenty-two groin flaps were used in 13 male and 7 females. It was used to close the amputated part in 8 patients as a result of finger amputation and degloving injury, in 3 patients as a result of hand and finger crush defect, in 1 patient as a result of burn finger defect, in 5 patients for extension contracture, and in 3 patients for flexion contracture due to burn sequel. Flap loss was not recorded in any of the cases.

Conclusion: Pediculated groin flap is a good alternative that can be easily and safely used in suitable cases and has an important place in the reconstruction of hand defects.

Keywords: Groin flap, hand, defect, reconstruction

INTRODUCTION

Defects on the dorsal and volar hand impose challenges for surgeons during reconstruction. Various pedicled and free flaps are described in the literature for closing these kinds of defects.[1-3] Pedicled groin flap has long been playing an important role in reconstructive hand surgery. This flap is a reliable method for closing the defects, particularly in dorsal hand injuries, and for closing the soft tissue defects of the hand[4,5] and is used in many clinical conditions.[4,6-8] Groin flap, despite microsurgery, is still used in reconstructive surgery as a reliable, easy, and rapid technique for closing primary soft tissue defects before a microsurgical procedure or for recovering free flap loss.[9,10] This study presents cases in which pedicled groin flaps were used for the reconstruction of soft tissue defects of the hand together with a review of the literature.

MATERIAL AND METHODS

Approval was obtained for this study from the Ethics Committee of Yüzüncü Yıl University Faculty of Medicine. The cases included in the study were those in which groin flap was used for hand defects in the Department of Plastic, Reconstructive and Aesthetic Surgery from 2010 to 2014. Historical data of the consenting patients were scanned, and the obtained data were evaluated. Age, gender, cause of defect, localization, size of the groin flap, donor site covering method, flap separation time, concomitant treatments, and complications were reviewed. A major complication was defined as flap necrosis, separation of the flap from the donor site, infection, or shoulder

Correspondence Author: Ahmet Kahraman, MD
E-mail: prcahmet@yahoo.com.tr

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Figure 1. a-d. Defect on the right hand and flap planning (a). Intraoperative view after the flap is removed (b). Intraoperative view after the flap is adapted (c). Postoperative view of the flap (d)
SCIA: superficial circumflex iliac artery

stiffness. Minor complications were defined as hematoma, seroma, wound separation in the donor site, and delayed (exceeding 14 days) wound healing.

RESULTS

Twenty-two groin flaps were used in 20 patients, of which 13 were male and 7 were female. The patients were aged between 2 and 49 years, with a mean of 21.5±13.904. Groin flap was used for digit amputation and for covering the stump after a degloving injury in eight patients, for defects related to a crush injury on the hand or on the digits in three patients, for tissue defects on the digits related to a burn injury in one patient, for extension contracture related to burn sequelae in five patients, and for flexion contracture related to burn sequelae in three patients. Although defects localized on the hand (12 cases, including 2 patients with defects in bilateral hands) and on the digits (10 cases), right groin flap was used in 11 patients and left groin flap in 11 patients. Flap donor sites were covered with primary closure in all cases. Flap sizes varied between 3×5 cm and 8×12 cm, with a mean of 6.4×9.9 cm. The groin flap was applied in two portions in two cases with multiple digit amputation and in three portions in one case. The time interval from the adaptation of the flap onto the defect until the separation of the pedicle ranged between 20 and 25 days, with a mean of 21.7 days. Among 20 cases, infection was encountered as a major complication in four cases treated with antibiotherapy and dressing. Partial wound separation at the donor site was a minor complication encountered in one case, which was treated with dressing and resuturation. No flap loss occurred in any of the cases, and all defects were successfully closed. No limited movement ability due to immobilization or no shoulder stiffness was encountered in any of the patients.

Case 1: The 16-year-old male patient presented to our clinic with a crush injury on the dorsal right hand after his right hand was caught in the wheel of a tractor. No tendon or bone pathologies were detected, and the patient was treated with dressing treatment. Debridement was applied after a necrosis demarcation line appeared. In the first operation, an 8×12 cm pedicled groin flap was elevated for the defect on the right hand and adapted onto the defect. Twenty-one days later, the flap was separated from the pedicle with a second operation, and the defect was closed by adaptation (Figure 1).

Case 2: The 27-year-old female patient presented to our clinic with hypertrophic scar tissues on the dorsum of bilateral hands

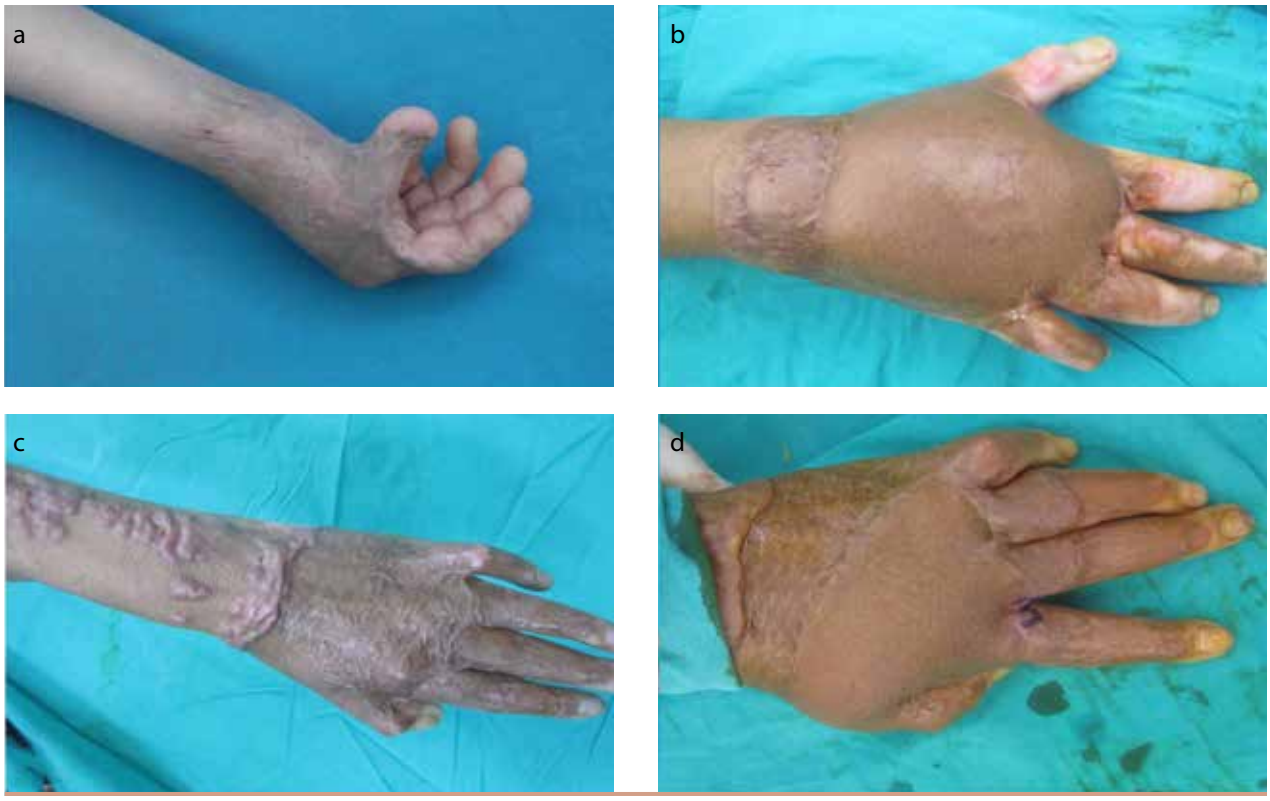

Figure 2. a-d. View of the preoperative scar on the right hand (a). Postoperative view of the hand and the flap (b). View of the preoperative scar on the left hand (c). Postoperative view of the hand and the flap (d)

and the face as well as extension contracture on the digits. Following the first operation, scar tissues on the dorsal left hand were excised, and the contractures of digits 2-3-4-5 were released. The resulting defect area was closed with an 8×12 cm groin flap prepared from the left side. Twenty-two days later, the flap was separated with a second operation and adapted onto the defect. In the same procedure, an expander was placed in the left supraclavicular region for the scar tissues in the left cheek and the chin. The patient was operated on in 2.5 months subsequent to expansion, and the expanded supraclavicular flap and the defect site caused by scar excision on the face were closed. In the same procedure, the scar tissues on the dorsal right hand were excised, and the contractures of digits 2-3-4-5 were released. The resulting defect area was closed with an 8×12 cm groin flap prepared from the right side. Twenty-one days later, the supraclavicular and groin flaps were separated adapted onto the defect (Figure 2).

Case 3: The 17-year-old male patient presented to our clinic with a degloving-type injury caused when the five digits of his right hand were trapped in a wire. In the physical examination, skin defect associated with a moderate degloving-type injury was identified on the proximal phalanx of the 5th digit. Because no tendon or bone pathologies were identified and the amputated piece was not suitable for replantation, a 6.5×7 cm groin flap taken from the right side was rolled into a tube to close the skin defect. Twenty-two days later, the flap was separated from the pedicle with a second operation, and the defect was closed by adaptation (Figure 3).

DISCUSSION

The groin flap, supplied by the superficial circumflex iliac artery system, was defined by McGregor and Jackson in 1972.[1,9-12] Free groin flap was first used in 1973 by Daniel and Taylor.[13] Pedicled groin flap is frequently used in the same hand and upper extremity defects.[14] In such defects, deep structures such as tendons, nerves, veins, bones, and joints are generally exposed. It provides good coverage for large defects on the hand and the forearm by supplying independent blood support to the site.[10,15-17]

Although minimal donor site morbidity is an advantage, the donor site can be primarily closed in many cases. Donor site morbidity can be more severe in cases that require grafting. Short operating time is another of its advantages. Although flap elevation is quick and easy, the case can be treated as an outpatient for secondary flap separation, adaptation, refinement, and further surgical procedures. In cases with coexistent soft tissue and bone defects, groin flap is an easy and reliable option for composite tissue transfer.[16] Flap thickness may be a disadvantage in obese patients and may require refinement. Alternately, expansion techniques can also be employed. Expansion can provide for flap refinement and harvesting of large flaps that allow for primary closure of the donor site. This procedure, however, is time consuming and requires a two-stage surgical process.[10] In our study, flap refinement was used in a few cases, but refinement was not required because none of the patients were obese. Because

Figure 3. a-f. Preoperative palmar view of the degloving-type injury on the 5th digit of the right hand (a). Preoperative dorsal view of the degloving-type injury on the 5th digit of the right hand (b). View after groin flap adaptation (c). Postoperative palmar view of the flap on the 5th digit of the right hand (d). Postoperative dorsal view of the flap on the 5th digit of the right hand (d). Postoperative view of the flexion movement in the 5th digit of the right hand (f)

defect sizes allowed for the primary closure of the donor site and none of our patients were obese, expanders were not preferred in any of the cases.

Graf and Biomer[17] indicated shoulder stiffness to be a significant complication that increases with age. It is rare among young patients, poses challenges in ensuring immobilization, and can have a negative impact on the supply to the flap.[14] Because our cases fell within a young age range and none were elderly individuals, we did not encounter any shoulder stiffness or restriction in movement. In all cases, care must be given to prevent involuntary movements; hence, separation of the flap, in the patient when coming out of anesthesia. The patient should be awakened only after immobilization is secured. In one of our cases, the flap separated from its site as a result of the patient's involuntary movements after being awakened before immobilization was secured, and the flap was readapted.

In 1977, Joshi reported using neurotized groin flap in four patients with severe degloving-type injury.[11,18] Flap innervation was performed with coaptation between the different sensory branches of the hand and the lateral cutaneous branch of the 12th thoracic nerve.[11] White *et al*.[11] reported that protective sensation characteristics could be provided with neurotized groin flap in cases with full-thickness skin loss on the thumb. It is useful to cut the flap into portions when closing multiple soft tissue defects. Although Saint *et al*.[4] reported the successful reconstruction of concurrent defects on the thumb and the surface of the dorsal hand with groin flap cut into portions, Rasheed *et al*.[19] reported the same in multiple digit defects. Bilobed groin flap was described in correcting the hand in Apert syndrome and in closing the defect that formed after opening the thumb contracture.[1,20,21] Further, bilobed groin flap is described in the literature for the reconstruction of defects secondary to trauma on the dorsal and volar surfaces of the hand.[1] Tan et al.[5] reported reconstructing a defect spanning both of the two digits on the second web space with a winged groin flap. A large part of our patient group consisted of digit amputations and degloving injuries. In injuries unsuitable for replantation, cutaneous and subcutaneous tissues of the amputated site were excised to preserve digit length. Bone and tendon structures of the amputated site were maintained, and bone embedding and tendon reconstruction was performed using Kirschner wires. Then, the amputated area was closed with a groin flap that was rolled into a tube. This helped to sustain the digit length and function in these cases. In two cases with amputation in two digits, bone and tendon structures were maintained using the same method and then the groin flap was cut into two portions to close the defect. In another case where three digits were affected, the flap was cut into three portions to close the defect. With this method, groin flap was evaluated to be a good option for preserving the length of the digits.

Free tissue transfer is another option in hand and upper extremity defects. Diverse types of flaps such as temporoparietal, dorsalis pedis, scapular, parascapular, serratus anterior, and latissimus dorsi can be used. Donor site morbidity, long operating time, increased perioperative and postoperative morbidity, and further requirement of specific equipment and trained and experienced teams and centers are its disadvantages.[16] Because smaller flaps are required, particularly in digit amputation cases, and multiple digits can be affected, free flap is not a suitable method, whereas pedicled groin flap comes forth as a good option. Groin flap can also be used in hand defects given its advantages such as short operating time, easy flap elevation, minimal donor site scar, and the absence of a need for special equipment and a special center.

CONCLUSION

Groin flap has an important place in the reconstruction of hand and forearm defects and has been accepted as a reliable and easy-to-apply option. For these reasons and despite the current microsurgery trend, groin flap maintains its position as a good option to bear in mind in suitable cases.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Yüzüncü Yıl University School of Medicine.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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