

Abstract

Combined Free Flaps in Reconstruction of Upper Extremity

**Sug Won Kim, M.D., June Bok Lee, M.D., Sung Jun Lee, M.D.,
Chul Hwan Seul, M.D., Dong Wan Seo, M.D.**

Department of Plastic and Reconstructive Surgery, Yonsei University, Wonju College of Medicine.

Advances in microvascular techniques and refinements in microsurgical tissue transfers have enabled surgeons to combine different tissue components and reconstruction into a single-stage operation in extensive or composite defect following injury. Some problems and consideration for extensive or composite defects are form, shape, function, and dimension of the defect sites. Therefore combination of two or more flaps is required to reconstruct extensive or composite defect. This paper presents our clinical experience of four cases of combined free flaps with or without sequential microanastomosis in reconstruction of upper extremity based on peroneal flow-through, thoracodorsal, and dorsalis pedis vascular system. Satisfactory results were obtained without flap loss and complications. The free flaps were combined in the following fashion; two cases by bridge fashion, one by chimeric microanastomosis and one by simple chimeric fashion. The median follow-up time on all patients was 21.7 months. Donor site morbidity was minimal. Extensive soft tissue or composite defects can be effectively covered by various combined flaps. Even though the risk for complication exists, the options of combination with or without sequential microanastomosis can add a functional or sensory dimension to reconstruction of complex wounds.

Key Words: Combined free flap, Upper extremity, Single-stage operation

- 鸕 2000 LA 69 Annual Scientific Meeting of the American Society of Plastic Surgery
- 鸕 2001 San Diego Annual meeting of the American Society for Reconstructive Microsurgery Podium
- 鸕 2001 Istanbul International Federation of Societies for Surgery of the Hand

	가				4
Baker	(profunda femoris) (biceps muscle) (semitendinous muscle)	가	31	55	42.8
, 1982	Harii	(thoracodorsal lar flap)			(fibu- (gracilis muscle flap) 1
artery)	(serratus anterior)	(combined free flap)	1		(peroneal perfora- tor flap) 1 , (dorsalis pedis flap) (extensor digitorum brevis muscle

Table 1. Patient Summaries

Case	Age/Sex	Site	Diagnosis	Operation	Flap size (cm)
1	55/M	Thumb,Lt.	Metacarpal bone & soft tissue defect	Fibular free flap & flow-through gracilis muscle flap	7 × 6
2	40/M	Thumb,Rt.	Proximal phalangeal bone, partial metacarpal bone & soft tissue defect	Fibular free flap & flow-through peroneal perforator flap	9 × 6
3	31/M	Forarm, Lt.	Composite tissue defect & gracilis muscle chimeric microanastomosis	LD musculocutaneous free flap	20 × 14 13 × 5
4	45/M	Hand, Rt. tendon defect	Skin defect & extensor dorsalis pedis & extensor digitorum brevis muscle flap	Simple chimeric fashion with	12 × 10 6 × 9

Table 2. Case analysis

Case	Primary flap	Secondary flap	Flap fashion	Complication	Follow-up
1	Fibula	Gracilis muscle	Bridge	No	21 months
2	Fibula	Peroneal perforator skin	Bridge	No	17 months
3	Latissimus Dorsi muscle	Gracilis muscle	Chimeric	No	36 months
4	Dorsalis pedis	Extensor digitorum brevis muscle	Chimeric	No	13 months

flap) 1 (peroneal artery)
 (thoracodorsal artery),
 (dorsalis pedis)
 (Table 1, 2).

가 가

2가 4
 (Fig. 1, 2, 3, 4).
 (bridge fashion)
 (chimeric fashion)

가

6 3 21.7

Hallock (compound flap)
 (composite flap),

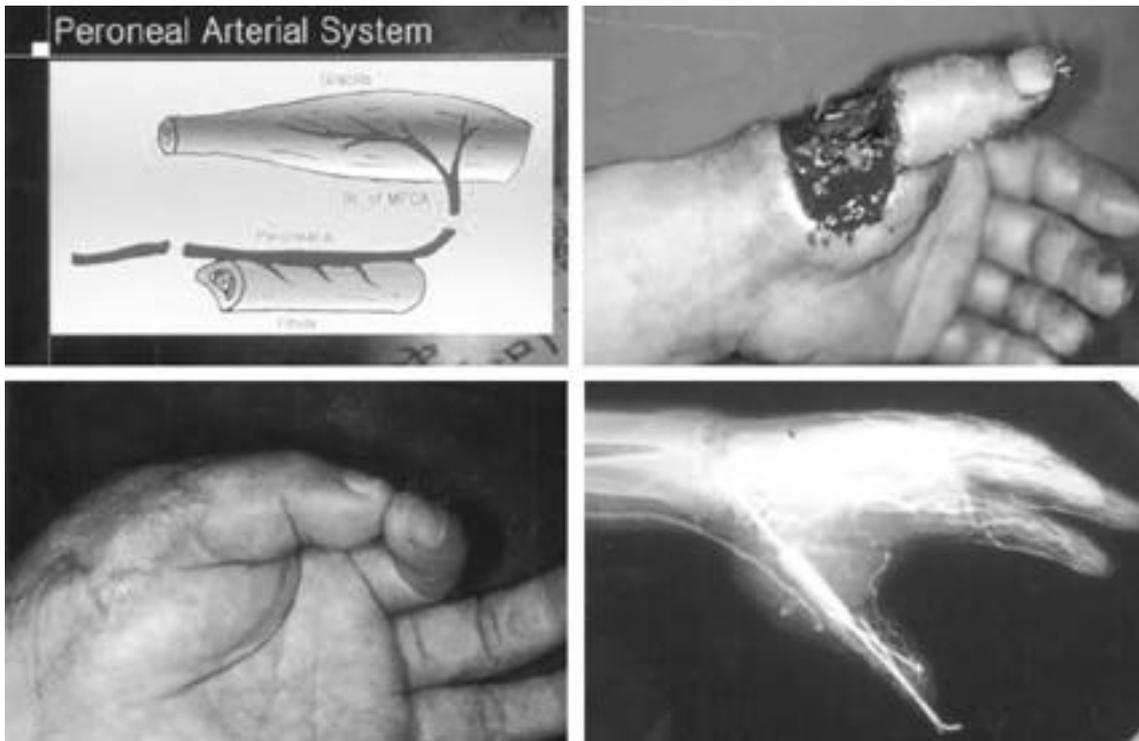


Fig. 1. Case 1. (Above, left) Schematic drawing of the peroneal vascular system combined with gracilis muscle flap. (Above, right) A 55-year-old-male presented after crush-avulsion injury from a compressor, resulting in a composite 9 × 6 cm defect. (Below, left) 20 degree voluntary flexion at the distal interphalangeal joint is noted after 4 months. (Below, right) Angiogram showing vascular architecture in combined free flap.

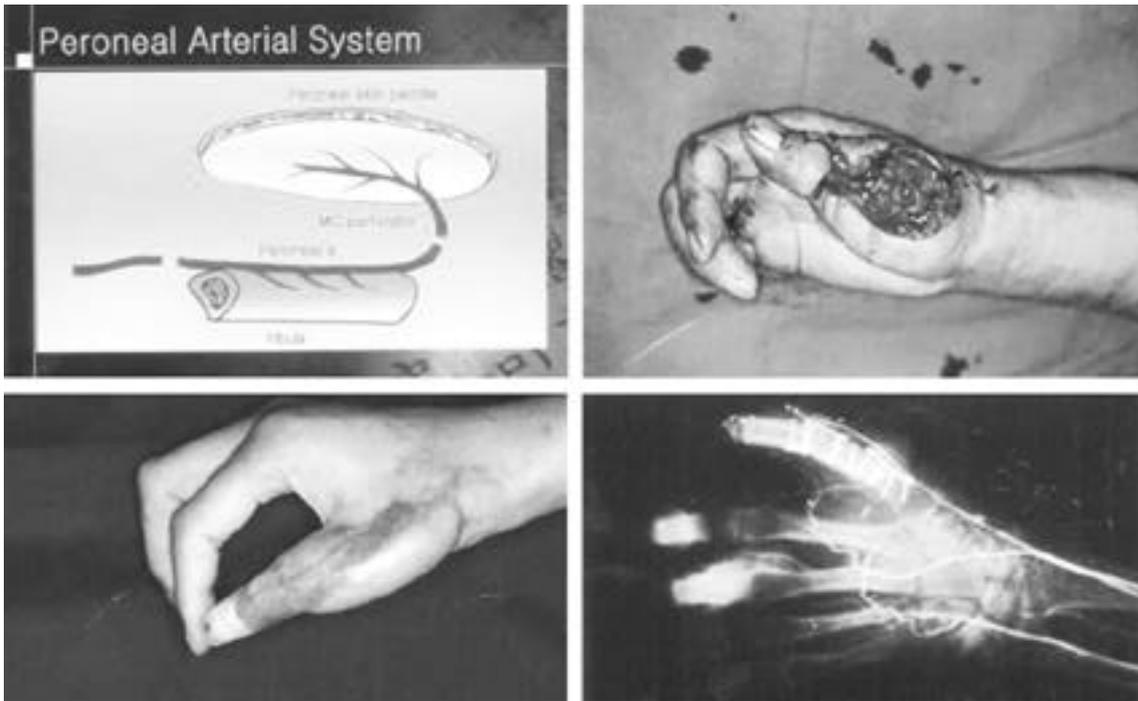


Fig. 2. Case 2. (Above left) Another case of the peroneal vascular system combined with peroneal perforator skin flap. (Above, right) This is a right hand with crush-avulsion injury from a compressor, resulting in a composite soft tissue, proximal phalangeal and metacarpal bone defect. (Below, left) 4 months after surgery with acceptable pinch motion and contour is noted. (Below, right) Postangiogram in combined free flap.

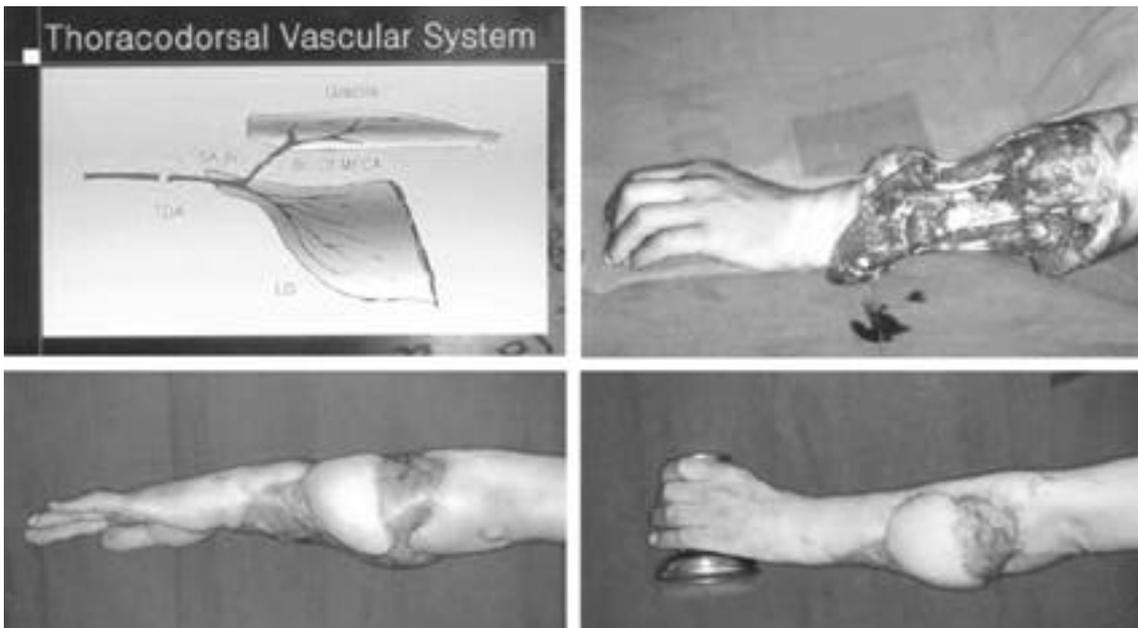


Fig. 3. Case 3. (Above left and right) The thoracodorsal vascular system was used to reconstruct extensive composite defect of the forearm function and resurfacing. (Below, left and right) 8 months after surgery with the function recovery of flexion and extension.

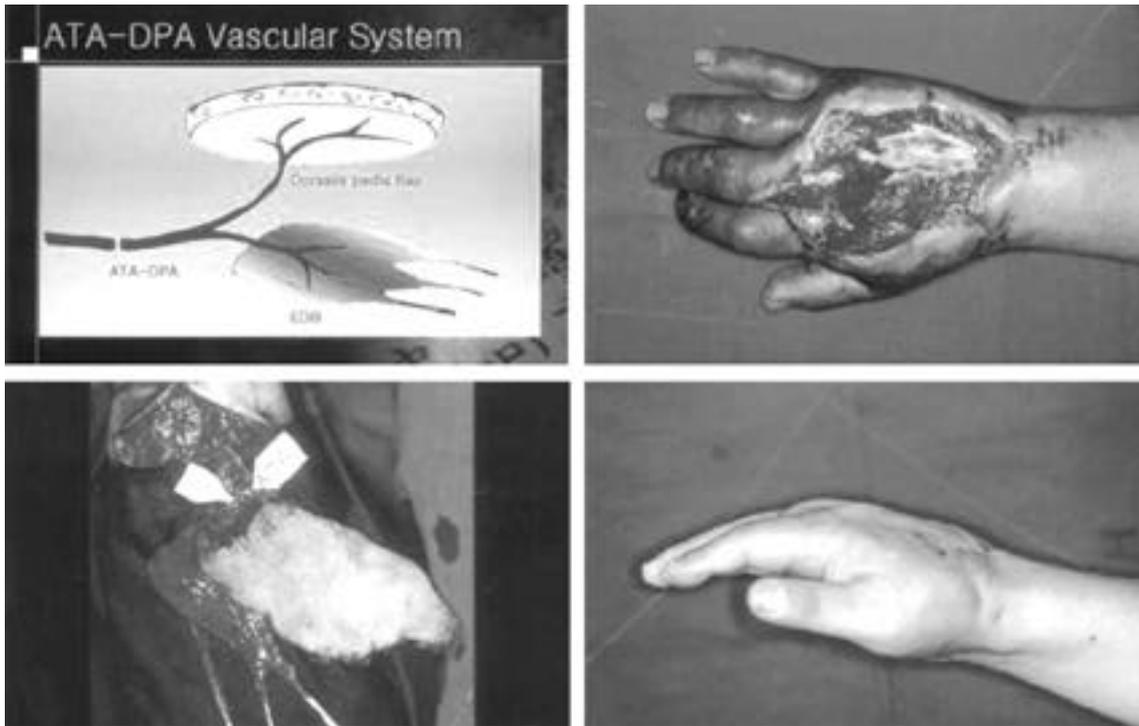


Fig. 4. Case 4. (Above, left) Schematic drawing of the dorsalis pedis vascular system combined with skin and extensor digitorum brevis muscle flap. (Above, right) This is a 45-year-old-male sustained from machinery crushing injury. (Below, left) As a simple chimeric fashion, combined dorsalis pedis and extensor digitorum brevis muscle flap. (Below, right) 3 months after surgery with the recovery of moderate extensor function.

(siamese flap), (chimera flap) (bridge flap), 가 .² chimeric type, case 3) (simple (fabricated chimeric type, case 4) .⁴ 가

가

.³ 가

(end-to-end) Case 1, 2 가 (1) (long axial vascular 가 (2) 가 (3) 가 .⁵

(Case 3, 4).

6

(torsion)

가

가

가

REFERENCES

1) Kiyonori Harii, M.D., Tsutomu Iwaya, M.D., and Noriyoshi kawaguchi, M.D.: *Combination Myo-*

cutaneous Flap and Microvascular Free Flap. Plast. Recons. Surg. 68: 700, 1981

2) Geoffrey G. Hallock, MD: *Simultaneous Transposition of Anterior Thigh Muscle and Fascia Flap: An Introduction to the Chimera Flap Principle. Ann Plast Surg 27: 126, 1991.*

3) Isao Koshima, M.D., Hiroshi Fukuda, M.D., and shugo Soeda, M.D.: *Free Combined Antrolateral Thigh flap and Vascularized Iliac Bone Graft with Double Vascular Pedicle.: J Reconstr Microsurg 1989; 5: 55-61*

4) Koshima I, Yamamoto H, Hosoda M, Moriguchi T, Orita Y, Nagayama H: *Free combined composite flap using the lateral circumflex femoral system for repair of massive defects of the head and neck regions; An introduction to the chimeric flap principle. Plast. Reconstr. Surg 92; 411, 1993.*

5) Y. Kimata, M.D., S. Tsukada, M.D., Iwamoto and K. Harii, M.D.: *Free combined parascapular flap and latissimus dorsi muscle flap for facial palsy and neck reconstruction.: Br. J. Plast. Surg. 48: 515, 1995.*

6) Kenji Sasaki, M.D., Motohiro Nozaki, M.D., Hiroaki Nakazawa, M.D., Yuji Kikuchi, M.D., and Ted Huang, M.D.: *Reconstruction of a Large Abdominal Wall Defect Using Combination Free Tensor Fasciae Latae Musculocutaneous Flap and Anterolateral Thigh Flap. Plast. Recons. Surg. 102: 2245, 1998.*