

:

Abstract

**Dorsalis Pedis Free Flap for Hand Reconstruction:
A Technique to Minimize Donor Deformity**

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One of the major advantages of microsurgical reconstruction for defects of the hand is that these techniques allow for selection of the most ideal tissue to reconstruct a particular defect, thus optimizing the functional and aesthetic outcome. The dorsalis pedis free flap is an excellent reconstructive tool for various hand reconstructions. It has a reliable vasculature with vessels that are relative large on a long pedicle. It provides thin pliable tissue and be innervated by deep peroneal nerve. Coupled with its thinness and pliability, it is ideal for innervated cover of critically sensitive area, especially such as the hand. Thus it can be used as a cutaneotendinous flap, or an osteocutaneous flap. Otherwise, the major criticism with this flap is related to its uncertain vascularity and the donor defect. It is the purpose of this paper to outline our technique of flap elevation and donor site closure and to indicate our current use of this flap in hand reconstruction. We have treated 10 cases (6 burn scar contracture cases, 4 acute hand trauma cases) of hand reconstruction from Dec. 3, 1997 to Mar. 4, 2004 using dorsalis pedis free flap. The key points for success in terms of a viable flap and acceptable donor site are the preservation of the critical dorsalis pedis-first dorsal metatarsal vascular axis and the creation of a viable bed for grafting. In addition, we substituted preserved superficial fat skin graft for split thickness skin graft and wet environment was offered for good graft take. Preserved superficial fat skin is defined as composite graft containing epidermis, dermis and superficial fat layer. With sufficient care in flap elevation and donor site closure, a good graft take of preserved superficial fat skin under wet environment can be achieved with no functional disability and minimal cosmetic deformity in donor site. This flap has proved itself to be a best choice for hand reconstruction.

Key Words: Dorsalis pedis free flap, Hand reconstruction.

(superficial layer of subcutaneous fat)
(composite skin graft)

가 가 가 2

(wet environment)

가 가 가
(two-point discrimination) 4 10 mm
가 가 가 .¹

(free composite tissue flap) 가 1997 12 2004 3
가

10

(dorsalis pedis artery)
(first dorsal metatarsal artery)
(pedicle), 1
(first web space), 가 (pulp)

35.8 , 7 , 3 .
6 (1
) , 4 (1
) (Table I).

(dorsalis pedis free flap) (posterior tibial artery)
(Doppler flowmeter)

가 , 가
(extensor tendon)

2 (second metatarsal bone)

(prograde flow)
(retrograde flow)

(mor- bidity)

1,2

1

(paratenon)

(preserved superficial fat skin; PSFS)
(epidermis), (dermis)

(great saphenous vein)
(superficial dorsal venous arch)

: :
 (deep peroneal nerve)
 1
 가 2 (tourniquet) 2
 1,2 1 (cutaneo-
 tendinous flap)
 snuff box
 2 (radial artery)
 1 10-0 nylon
 1 (first dorsal (radial nerve)
 interosseous muscle)
 1 (first plantar
 metatarsal artery)
 (extensor hallucis brevis tendon) , 가

Table 1. Summary of patients.

Case	Age (years)	Sex	Cause of Reconstruction and site	Associated lesions	Donor closure	Complications	Follow-up (months)
1	36	M	BSC&tendon adhesion, right wrist		STSG		28
2	31	M	BSC, left 1st web space		alloderm &STSG	hematoma	23
3	28	M	Acute avulsion injury, left hand dorsum		alloderm &STSG	arterial insufficiency	25
4	48	F	Acute degloving injury, left hand dorsum	2nd, 3rd extensor 2nd phalanx fracture tendons rupture	STSG		20
5	32	F	BSC, right 1st web space		STSG	partial skin graft loss	22
6	38	M	Contact burn, left hand dorsum		STSG		
7	19	F	BSC, right 1st web space		PSFS		18
8	43	M	BSC, left 1st web space		PSFS		
9	34	M	Acute avulsion injury, left hand dorsum	2nd extensor tendon rupture	PSFS	epithelial loss	10
10	49	M	BSC, right 1st web space		PSFS		1

* BSC, burn scar contracture; STSG, Split thickness skin graft; PSFS, Preserved superficial fat skin.

4 , Alloderm 가 가
 2 , 4 가 가
 PSFS 가 가
 PSFS 가 가
 (groin) (Fig. 3).
 3 mm 1. 1
 epinephrine 48
 가 2,3 2
 (bolus dressing) 2,3 2
 가 2,3 20
 K-wire 2 2,3
 (splint) 가 (Fig. 1).
 3 1 2. 2
 (arterial insufficiency) 19 1
 5 1 (first dorsal
 interosseous muscle) (adductor
 pollicis) 1
 가 1
 1 (maximal abduction angle),
 (maximal abduction distance),
 (radial abduction angle), (palmar
 abduction angle)³가 60 , 20 mm, 45 ,
 25 77 , 40 mm, 60 , 45
 , Alloderm PSFS 18
 가 (Fig. (Fig. 2,3).
 1). 가 PSFS

가
2
가

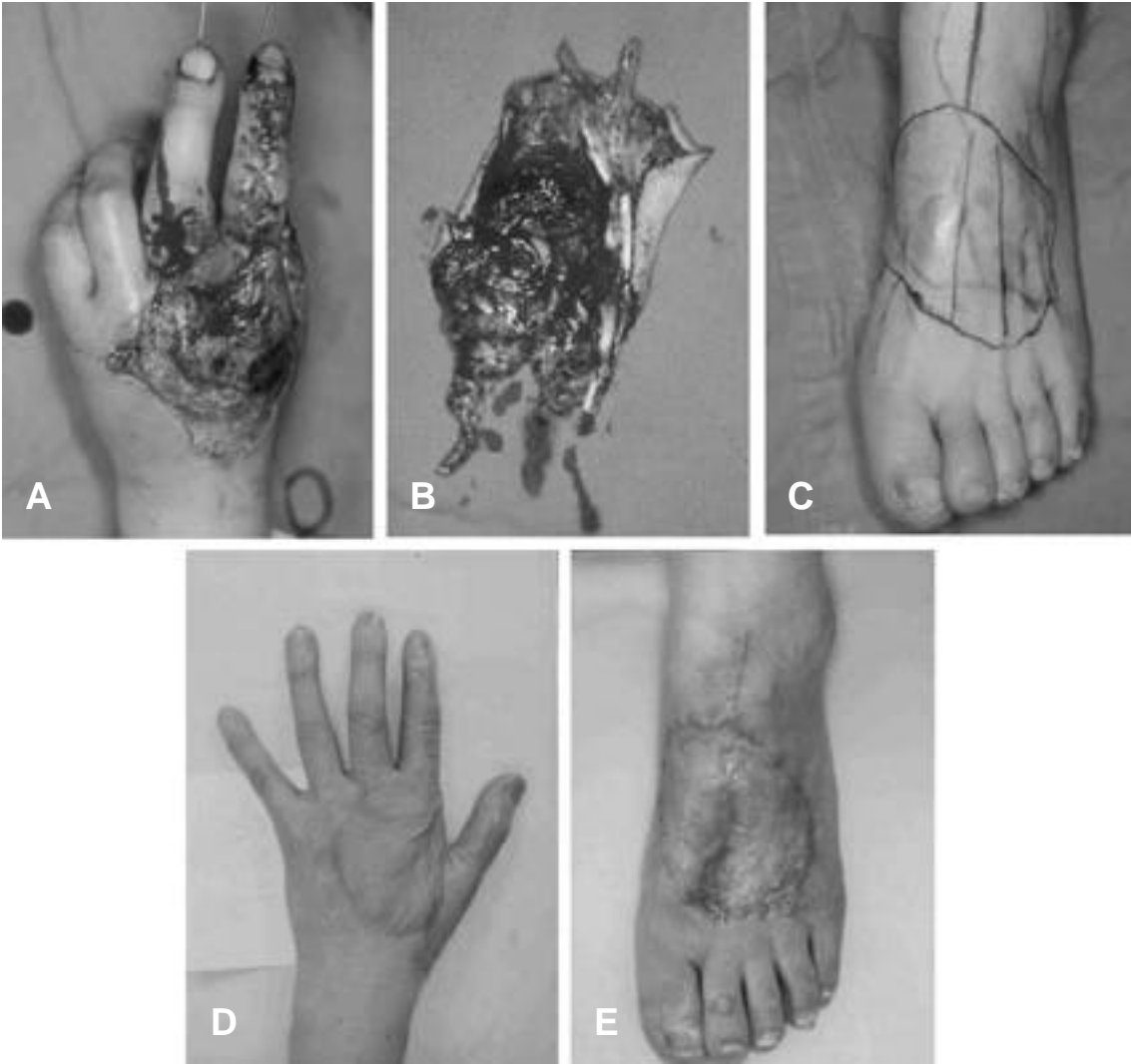


Fig. 1. Acute degloving injury of left hand dorsum which was associated with ruptures of 2nd, 3rd extensor tendons and fracture of 2nd phalanx. (A) Dorsalis pedis free flap with 2nd, 3rd extensor tendons. (B) The preoperative design of the dorsalis pedis free flap in the left foot dorsum. (C) Transfer of the dorsalis pedis free flap with vascularized extensor tendons, seen 20 months postoperatively. (D) Split thickness skin graft to left foot donor site, seen 20 months postoperatively. Skin graft site with scar contracture presents a strange contrast to surrounding normal skin in its texture and color. (E)

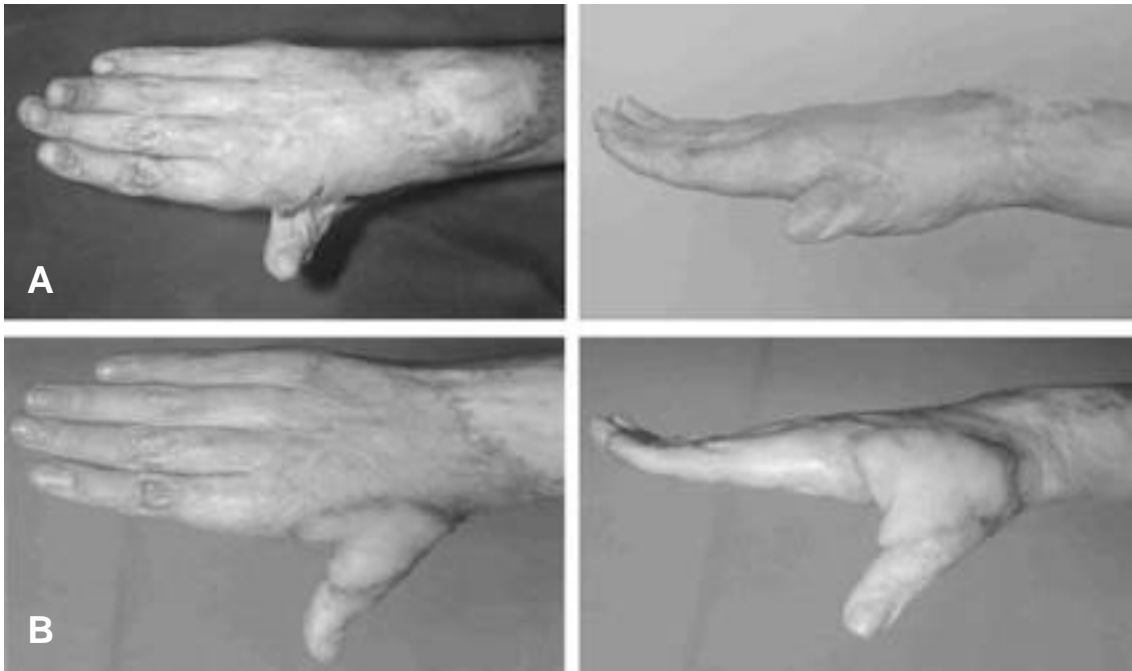


Fig. 2. Severe first web space contracture. Note that metacarpophalangeal joint of thumb was hyperextended and interphalangeal joint was flexed. **(A)** Transfer of the dorsalis pedis free flap, seen 18 months postoperatively. Radial abduction angle and maximal abduction angle is nearly same to the contralateral side. **(B)**

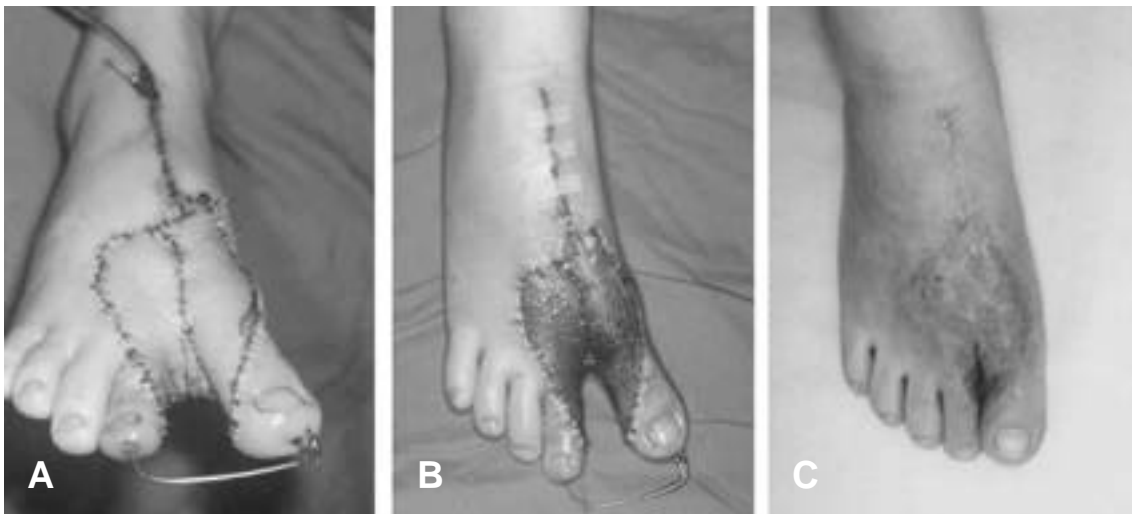


Fig. 3. Preserved superficial fat skin graft application to defect immediately after flap elevation and hemostasis. **(A)** The purple colored graft on the 1st postoperative week. **(B)** The composite skin graft site is similar to surrounding normal skin in its texture and color, seen 18 months postoperatively. **(C)**

가
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 1
 . May ⁴ 18%
 1
 , Man Acland 2
 23 가 3
 . Grant 3.7%
 (peroneal artery) (perfora PSFS
 tor branch) 가 ,
 (anterior tibial artery) 가
 , 가
 . Zuker Manktelow
 45
 가
 ,
 가
 ,
 (angiogram) (growth factor) (fibrogen) 가
 Baniš 1 ⁹ ¹⁰
 3 (triangulation- 가
 type technique of Doppler examination) 가
 . PSFS 3
 가 가 가
 . 가 가
 가 가
 가
 , PSFS
 , (hyperpigmentation)
 가
 가
 1
 , 가 ,

가 , PSFS
가

가

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