

Abstract

Analysis of 174 Consecutive Free Flaps

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One hundred & seventy four consecutive free-flap transfers were reviewed to analyze distribution of the type of reconstructions, kinds of donor flaps as well incidence of complications. The role of emergent exploration and the effect of preoperative wound conditions in flap survival were evaluated. Free flap transfer for head and neck reconstruction was most common as 93 cases, followed by for upper extremity of 30 cases, for lower extremity 30 cases, 18 penile reconstructions and for trunk & breast 3 cases. Nine flaps exhibited signs of circulatory insufficiency between 5 hours and 7 days. Three were managed conservatively with ultimate partial necrosis of the flaps. Eight flaps required return to the operating room. On exploration, early arterial occlusion was revealed in 1 flap, late arterial occlusion in 2 flaps, early venous occlusion in 1 flap, late venous thrombosis in 2 flaps, prolonged venous spasm in 1 and hematoma in 1 flap. The average time from the first abnormal examination to exploration was 2.6 hours. There were no false-positive explorations. Four free flaps failed in spite of the correction of the cause of circulatory compromise. The remaining 4 flaps were salvaged following the correction the cause. Recipient vessel problems such as irradiation and infection were the most common cause of circulatory crisis. Among the eight flaps requiring return to the operating room, single vein was anastomosed in three flaps and two veins in the remaining five. In the totally failed four flaps only single vein was anastomosed in three cases. The results of this study demonstrate the efficacy of clinical monitoring and the role of early exploration. Precautious selection of recipient vessels and two vein anastomosis are recommended for safe and better prognosis.

Key Words : Free flap, Early exploration, Free flap failure, Arterial occlusion, Venous occlusion

Table 1. Free flap transfers totaling 174 flaps.

Types of reconstruction	No.	Percent
After tumor ablation	56	32
Mandible reconstruction	10	6
Soft tissue defect	43	25
Penile reconstruction	18	10
Toe to hand transfer	14	8
Functional muscle transfer	9	5
Correction of postburn scar	13	8
Contouring & esthetic	11	6

Table 2. Summary of free flaps according to application site.

Site	Number	Percent
Head and Neck	93	54
Upper Extremity	30	16
Lower extremity	30	16
Penile Reconstruction	18	10
Trunk and Breast	3	4

Table 3. Summary of donor free flaps

Donor flap	Number
Radial forearm	85
Dorsalis pedis	13
Latissimus dorsi	24
Iliac	9
Toe	13
Parascapular	7
Rectus abdominis	5
Gracilis	8
Omentum/medial plantar/lateral arm	2*
Scapular/rib/jejunum/gluteal	1*

* : denotes the number for each flap

forearm flap 85 , dorsalis pedis flap 13 , latissimus dorsi flap 24 , deep circumflex iliac artery(DCIA) superficial circumflex iliac artery(SCIA) pedicle iliac bone flap 9 , great toe second toe 13 , parascapular flap 7 , omental flap 2 , gracilis muscle flap 8 , rectus abdominis muscle flap 5 , lateral arm flap 2 , medial plantar flap 2 ,scapular flap, rib bone, jejunal

90 95% 1-5,8,10,11,13,14,19,20,22)

가 8,10,11,19)

가

가

가

15)

가

17

174

retrospective

1983 5 2000 2

174

56 (32%),

10 (6%),

43 (25%),

18 (10%),

14 (8%),

13 (7.5%),

11 (6%),

9 (5%) (Table 1).

93 (54%), 30 (17%), 30 (17%),

18 (10%),

3

(4%) (Table 2).

Table 4. Summary of patients requiring operative exploration

Pt.	Age/Sex	Diagnosis	Flap	Vein	Major problem	Management	Flap fate
1	M/48	Laryngeal Ca.	Jejunum	1	Arterial insufficiency	Gastric pull up	Fail
2	F/19	Open wound(forearm)	LD-MC	1	Endarteritis	Flap returned	Fail
3	F/49	Postinflamm, cheek	Forearm	2	Vein thrombosis	Debridement	Fail
4	F/47	Facial palsy	Gracilis	1	Vein thrombosis	AV shunt formation	Fail
5	F/45	DM foot	LD-M	2	Venous spasm	Anastomosis revised	Partial
6	F/23	Postinflamm. Buttock	Forearm	2	Hematoma	Evacuation	Success
7	F/38	AVM, face	Forearm	2	Venous occlusion	Anastomosis revised	Success
8	M/11	Floating thumb	Wrap around	2	Arterial occlusion	Anastomosis revised	Success

flap, gluteal myocutaneous flap (Table 3). monitoring
 2 C 가 , Capillary refill
 가 blanching
 “Insert sutures first, Tie later” exploration .
 15,16)
 10-0 nylon(ethicon)
 DCIA SCIA 2 iliac
 osteo-cutaneous flap 174
 1 4 170 97.7%
 pedicle 가
 series
 4 , 2 , 6
 vascular approximator
 100unit/ accidental avulsion
 M2 heparinized Ringer’s lactate solution 가 , (arterial
 irrigation , 5 insufficiency) 3 , (venous
 Aspirin 2.0gm/day Dextran 500cc/day insufficiency) 6 , 1 , 1
 routine , 2 14
 3 (8%)
 Urokinase 200,000unit/day . Vessel avulsion
 가 가
 surface temperature, capillary refill,
 blanching 가 ,
 nasoendoscope pedicle - 3 DCIA 1
 3 monitoring ,
 7 Tc^{99m} Bone Scan jejunum 가 1
 temperature floating thumb
 probe, Doppler . wrap-around procedure

3cm vein graft

7

6 2

2

500cc

tension

6

floatation thumb wrap-around procedure

174

2

spasm prolonged venous congestion

anterior tibial artery

4

13

cross leg free

가

flap transfer

induction

가

cannulation

shunt)

1

(A V

2

hemothorax

가

71

가가

11

(acute

respiratory distress syndrome)

, 7

interosseous artery

endarteritis

가

spasm

1

1 :

2

19

1

circumflex scapular vein

cephalic vein

4

2

spasm

8

ecchymosi

4

teriti

interosseous artery

endar-

spasm

4

ecchymosis

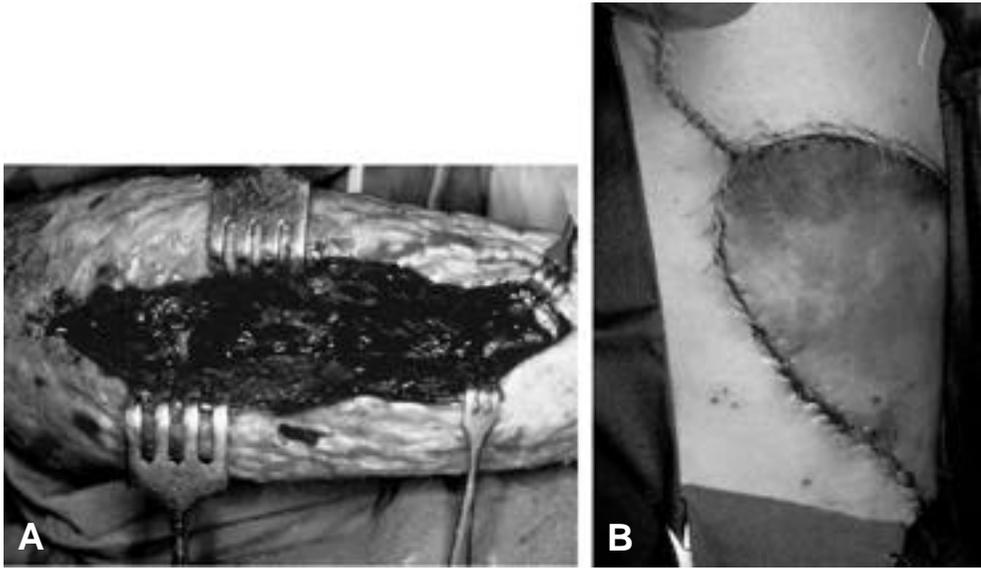


Fig. 1. A 19 years old female patient with chronic open wound on the left forearm
A. Intraoperative view, the interosseal vessels were inadequate for free flap transfer.
B. The latissimus dorsi flap returned to the donor site. In spite of reanastomosis of the venous pedicle, venous thrombosis progressed to total flap failure.



Fig. 2. A 45 year old female patient with diabetic gangrene of the heel.
A. Preoperative view shows the extent of the diabetic gangrene.
B. Flap congestion and multiple punctate hematoma seen 2 days postoperatively.
C. After revision of the venous pedicle and before skin graft. Partial loss of the muscle flap is noted.

가 2 spasm
 . Exploration
 7
 stasis
 2 :
 45 2 가

가

exploration

33 ~ 81%

8,11,13)

90 ~ 95%

, 1973 Daniel

10

2,000

93.3% 9).

100%

10).

60%

reexploration

6,12,16,22)

microvascular

anastomosis technique

early occlusion 3cm vein graft

metatarsal artery radial artery

wrap around procedure 1

exploration

97.7%

monitoring

7

“Insert

sutures first, Tie later”

17,21)

4

reexploration

Tsai^[22]

anastomotic thrombosis가

가

groin flap

toe transfer

monitoring,
monitoring

monitoring

exploration

79%

가

pedicle

174

6

vein graft

vein graft

가

10).

가

가

prob가

Freedman

vein graft

25

free flap

12%

pulsed

가

pedicle

dopple가

, invasive technique

vein graft

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가

18)

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(spasm)

phlebitis

endarteritis,

1

2

Acute stage

vein graft

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monitoring

monitoring

exploration

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tension

가 2

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