

The Lateral Supramalleolar Flap : Report of 18 cases

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ABSTRACT

A retrospective, continuous clinical series of 18 lateral supramalleolar flap procedures is reported. The flaps were used to cover the defects at lower third of the tibia in 3 cases, ankle and heel in 11 cases and dorsum of the foot in 4 cases. The flap were designed as a rotation flap in 3 cases, distally based pedicle flap in 9 cases and fasciutaneous flaps in 6 cases. One flap was lost and marginal necrosis ocured in 2 flaps in our series. Functional morbidity of the donor area is minimal.

Reconstruction of soft tissue defects on the lower pretibial surface of the leg, foot and ankle remain a challenge to surgeons. If the defect is large and complicated by bone defects, free tissue transfer of cutaneous or muscle flaps are well established and the results are satisfactory¹⁻³. However, a local flap is still popular because it is a simple, one-stage and reliable operation. When the soft tissue defect is small, an available local flap is more convenient and economical than free tissue transfer.

In 1988 Masquelet et al⁴ described the lateral malleolar flap designed on the lower third of the lateral aspect of the leg. It is supplied by a cutaneous branch from the perforating branch of the peroneal artery. This perforating branch continues distally deep to the fascia along the ankle going down into the foot (Fig. 1).

The perforating branch has been demonstrated to be a constant, always emerge 5 cm. above the lateral malleolus in the groove between the tibia and the fibula approximately one-fifth of the length of the fibula⁵. The lateral supramalleolar flap can be designed as a rotation flap (Fig. 2), distally based pedicle flap (Fig. 3) or fasciocutaneous flap (Fig. 4)⁶.

This study reports our experience in covering soft tissue defects of the lower third of the leg, ankle, heel and dorsum of the foot with the lateral supramalleolar flaps.

MATERIAL AND METHODS

From January 1992 to March 1995, 18 patients were scheduled for lateral supramalleolar flaps. There were 16 males and 2 females in this series. Ages ranged from 7 to 42 years, with an average of 21 years. The flaps were used to cover the defects at lower third of the tibia in 3 cases, ankle and heel in 11 cases and dorsum of the foot in 4 cases. The flaps were designed as rotation flaps in 3 cases, distally based pedicle flaps in 9 cases and fasciocutaneous flaps in 6 cases. The clinical data are listed in Table 1.

RESULTS

Complete, uneventful healing of the flaps were observed in 16 cases. One flap was lost. This occurred in our early cases which the pedicle was inadvertently damaged. Marginal necrosis occurred in 2 distally based pedicle flaps. In both cases, the proximal end of the flap were designed beyond the midlevel of the fibula. In all cases the donor area was grafted without any functional impairment.

CASE REPORTS

CASE 1. A 37-year-old man sustained an open fracture type 3B of the right tibia. The soft tissue defect was on the anteromedial site of the right tibia. After stabilization of the right tibia with the external fixator, a lateral supramalleolar flap designed as the rotation flap sized 8x11 cm. was used to cover the defect. Healing was uneventful. (Fig. 5)

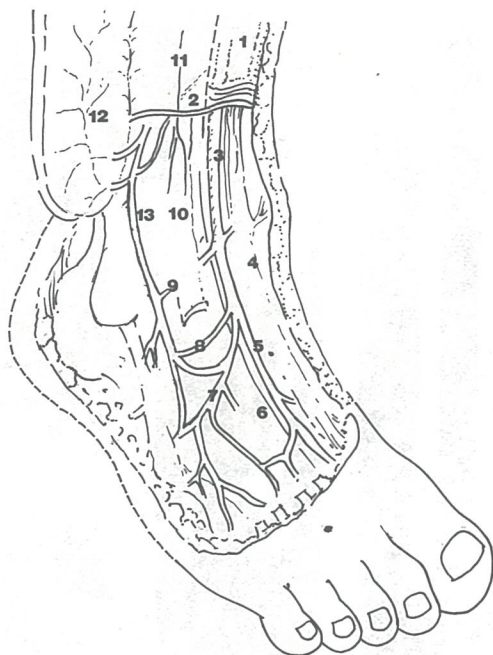


Fig. 1 The general pattern of the arterial distribution on the lateral malleolar area: 1) retinaculum extensorum superius, 2) proximal collateral branch from the anterior tibial artery, 3) anterior tibial artery, 4) extensor hallucis longus, 5) dorsalis pedis artery, 6) tibialis anterior nerve, 7) lateral tarsal artery, 8) sinus tarsi artery, 9) lateral malleolar artery, 10) extensor digitorum longus, 11) superficial peroneal nerve, 12) cutaneous branch for the flap issued from the perforating branch of the peroneal artery, 13) descending branch of the perforating branch of the peroneal artery.

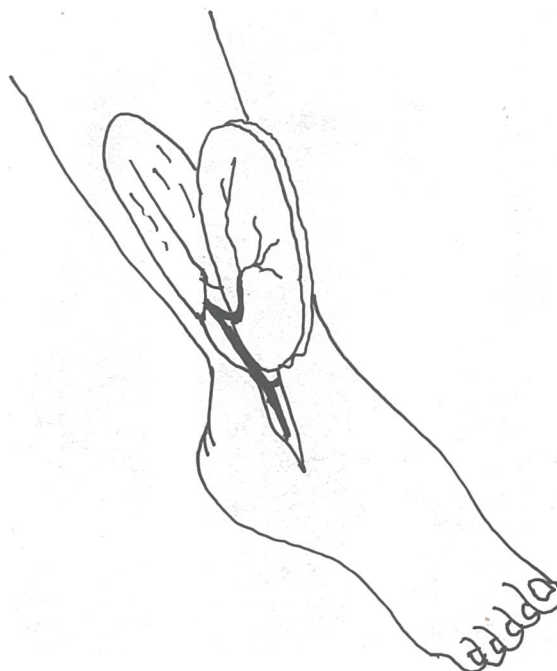


Fig. 2 The lateral supramalleolar flap designed as a rotation flap

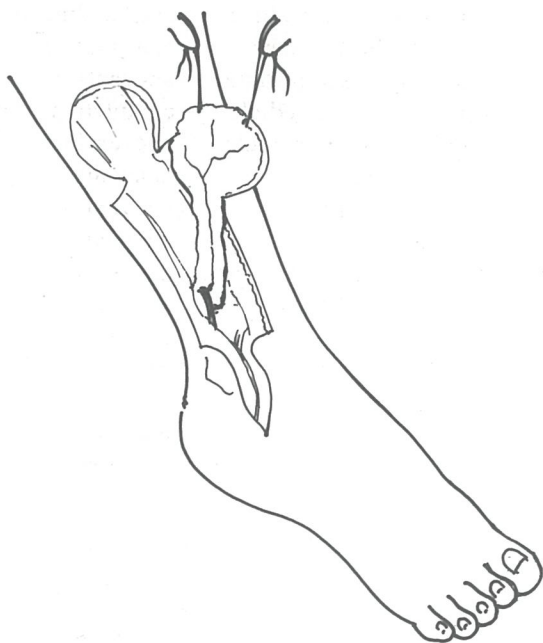


Fig.3 The lateral supramalleolar flap designed as a distally based pedicle flap

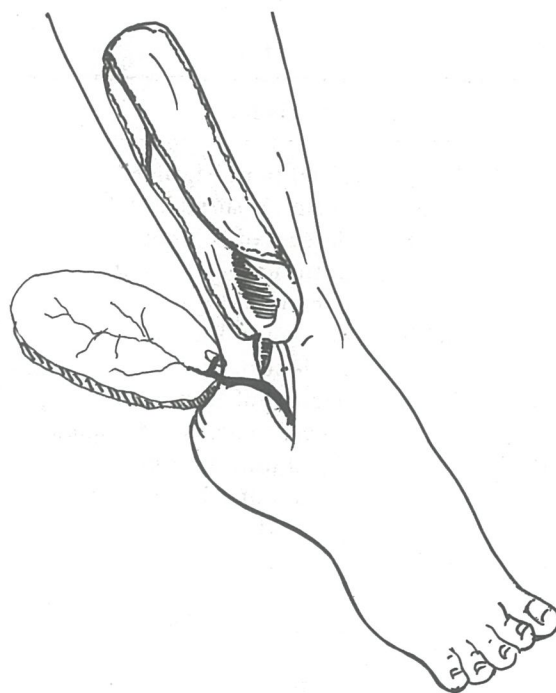


Fig.4 The lateral supramalleolar flap designed as a fasciocutaneous flap

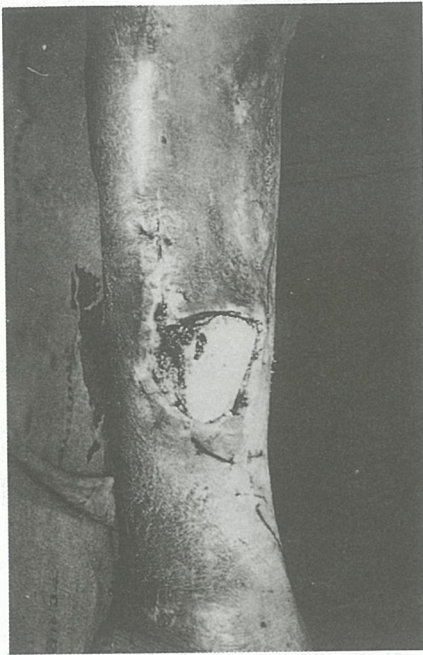
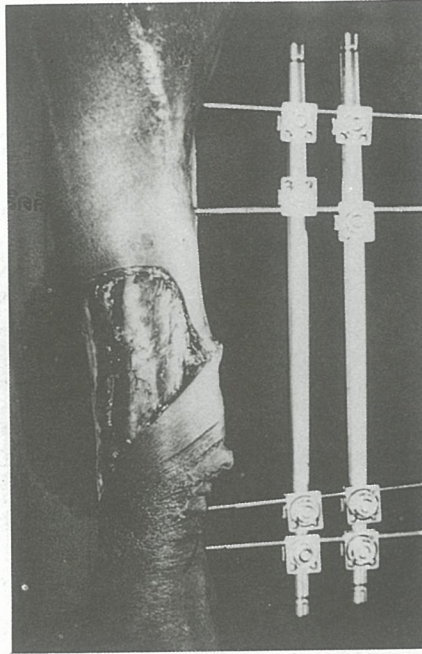
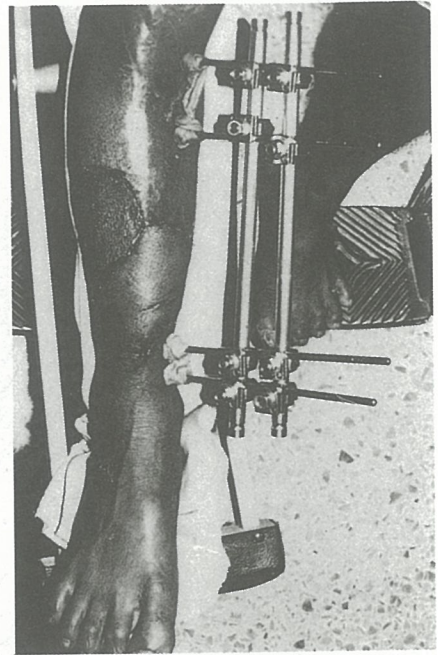


Fig. 5 a) Open fracture type III B of the right tibia



5 b) After stabilization of the tibia with external fixator, A lateral supra-malleolar flap designed as a rotation flap was used to cover the defect



5 c) The donor area was grafted

Table I

Case	Sex/Age	Skin defect	Size of flap (cm)	Type of flap	Result
1	M/37	distal third Rt. tibia	8 x 11	rotation	uneventful
2	M/31	posterior surface Lt. heel	5 x 6	distally based pedicle	uneventful
3	M/28	dorsum of Lt. foot	5 x 9	distally based pedicle	uneventful
4	M/36	posterior of Rt. ankle	5 x 11	distally based pedicle	uneventful
5	M/25	dorsum of Lt. foot	6 x 13	distally based pedicle	marginal necrosis
6	M/17	dorsum of Rt. foot	6 x 12	distally based pedicle	marginal necrosis
7	M/12	heel+post. surface of Rt. ankle	5 x 8	distally based pedicle	uneventful
8	M/42	dorsum of Rt. foot	5 x 11	distally based pedicle	complete necrosis
9	M/ 7	anteromedial site Rt. ankle	6 x 12	distally based pedicle	uneventful
10	M/	distal third Lt. tibia	6 x 11	rotation	uneventful
11	M/	distal third Rt. tibia	6 x 10	rotation	uneventful
12	F/ 25	Rt. ankle	4 x 5	fasciocutaneous	uneventful
13	M/32	Rt. heel	6 x 10	distally based pedicle	uneventful
14	M/20	Lt. ankle	5 x 6	fasciocutaneous	uneventful
15	M/28	Rt. ankle	6 x 7	fasciocutaneous	uneventful
16	M/31	Lt. heel	5 x 6	fasciocutaneous	uneventful
17	M/40	Lt. heel	5 x 6	fasciocutaneous	uneventful
18	F/12	Rt. heel	5 x 7	fasciocutaneous	uneventful

CASE 7. A 12-year-old girl sustained a skin defect on the heel and posterior surface of the right ankle in a motorcycle accident. The posterior tibial artery was severed. The lateral supramalleolar flap raised as a distally based pedicle flap (5x8 cm.) was performed to cover the defect at the heel. The donor area and the defect at the posterior surface of the right tibia were grafted. The post-operative course was uneventful. (Fig. 6)

CASE 12. A 25-year-old man was involved in a car accident with soft tissue loss at the anteromedial site of the right ankle. The defect was covered with a fasciocutaneous pedicle flap sized 4x5 cm. passed beneath a subcutaneous tunnel over the tibial crest. Healing was uneventful. (Fig. 7)

DISCUSSION

Soft tissue defects in lower third of the tibia, ankle and foot are difficult to reconstruct because of the relatively poor blood supply and the scanty available soft tissue in this region. Several fasciocutaneous flaps have been described to cover the skin in these region, such as dorsalis pedis flap⁷, anterior tibial flap⁸ and peroneal flap⁹. They require the sacrifice of a main artery of the foot. The instep flap provides excellent coverage of the heel but its

arc of rotation is limited by the length of the medial plantar artery, and the sizes of the flap cannot overlap on the weight bearing area of the plantar foot.

The main advantage of the lateral supramalleolar flap are as follows

1) It may be a rather large flap (8x11 cm. in this series)

2) The pivot point of the pedicle in the distally based flap designed is distal (sinus tarsi) and allows great local possibilities of coverage.

3) The donor site has a muscular bed and is reliability resurfaced with a skin graft.

However some disadvantages of the flap should be pointed out (1) Donor site scar at the lateral aspect of the leg, which may be a problem for young woman (2) There may be some venous congestion especially in distally based pedicle flap¹⁰.

We have now limited the proximal extent of the flap not beyond the midlevel of the fibula to prevent marginal necrosis of the flap. We avoid using this flap when the groove between the fibula and the tibia has been involved during the trauma.

We have found the lateral supramalleolar flap to be a versatile and reliable in soft tissue defects coverage of the lower third of the leg, ankle, heel and dorsum of the foot.

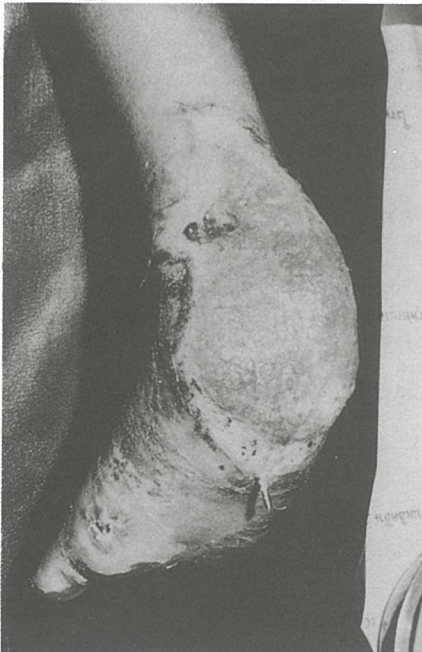
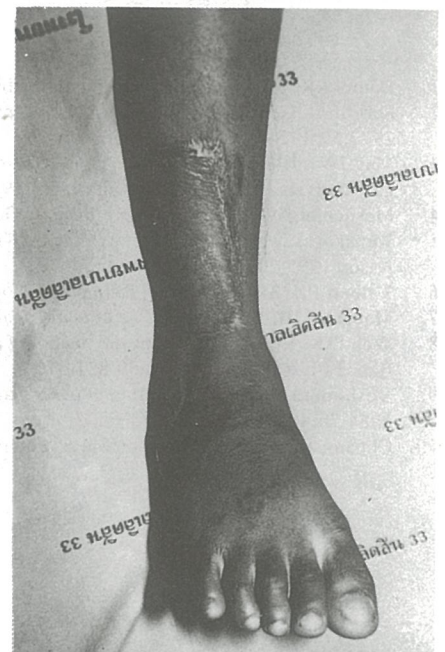


Fig.6 a) Soft tissue defect at the heel and posterior surface of the right ankle



6 b) The heel was covered with distally based pedicle flap



6 c) The donor area was grafted

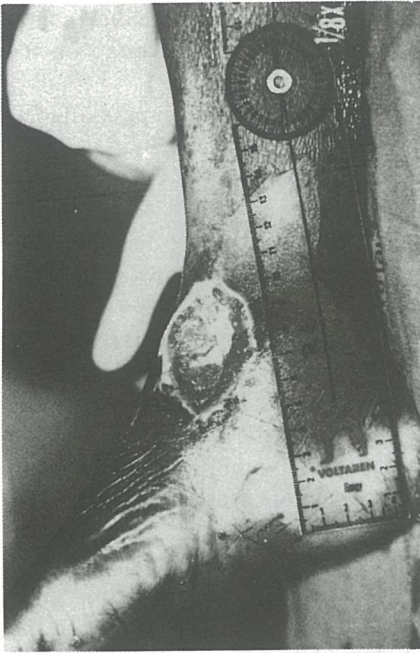
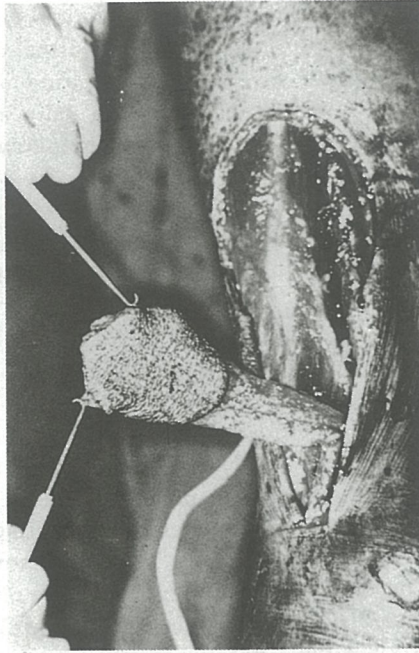


Fig.7 a) Soft tissue defect at the antero-medial site of the right ankle



7 b) Elevation of skin flap and pedicle including the deep fascia



7 c) The flap was passed beneath a subcutaneous tunnel over the tibial crest and placed on the defect

REFERENCES

1. Daniel RK, Taylor GI. Distant transfer of an Island flap by microvascular anastomoses a clinical technique. *Plast Reconstr Surg* 1973;52:111-7.
2. Serafin D, Geogiade NC, Smith DH. Comparison of free flaps with pedicle flaps for coverage of defects of the leg or foot. *Plast Reconstr Surg* 1977;59:492-9.
3. May JWJ, Halls MJ, Simson SR. Free microvascular muscle flaps with skin graft reconstitution of extensive defects of the foot: A clinical and gait analysis study. *Plast Reconstr Surg* 1985;75:627-39.
4. Masquelet AC, Beveridge J, Romana C, Gerber C. The lateral supramalleolar flap. *Plast Reconstr Surg* 1988;81:74-81.
5. Kunakornsawat S, Leechavengvongs S, Witoonchart K, Ueapairojkit C. An anatomic study of the lateral supramalleolar flap. *J Thai Orthop Assoc* 1995;20:34-9.
6. Valenti PH, Masquelet AC, Romana C, Nordin JY. Technical refinement of the lateral supramalleolar flap. *J Plast Surg (Br)* 1991;44:459-62.
7. Macgraw JB, Furlow LT. The dorsalis pedis arterialized flap : A clinical study. *Plast Reconstr Surg* 1975;55:177-85.
8. Wee JTK. Reconstruction of the lower leg and foot with the reversed pedicle anterior tibial flap : Preliminary report of a new fasciocutaneous flap. *J Plast Surg(Br)* 1986;39:827-37.
9. Yoshimura M, Imura S, Shimamura K, Yamauchi. Peroneal flap for reconstruction in the extremity : preliminary report. *Plast Reconstr Surg* 1984;76:402-9.
10. Chuangsuwanich A, Mungsombut S. Lateral supramalleolar flap. *Siriraj Hosp Gaz* 1990;4:218-23.