

FASCIOCUTANEOUS FLAP-A VERSATILE TECHNIQUE TO RESURFACE LEG AND FOOT

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SUMMARY

A total of fourteen cases of full thickness defects of leg and foot have been resurfaced with fasciocutaneous flaps either as a local rotation-transposition or island flap in a single-staged procedure. All the flaps were proximally based and were found to be vascular and reliable. The results were satisfactory functionally and cosmetically with acceptable donor site morbidity.

(Key Words : fascio-cutaneous flaps, full thickness defects, resurfacing of leg and foot.)

The use of fasciocutaneous flaps for resurfacing full thickness defects of leg and foot was evaluated by us in various clinical situations with a view to find out their reliability and versatility as a full thickness cover for defects of the leg and foot.

Material and methods

A total of fourteen cases of full thickness defects of the leg and foot were studied during the period from January 1988 to February 1989. In thirteen cases, the defects were post-traumatic and in one patient the defect was post-burn.

All the fasciocutaneous flaps in leg were proximally based. The length breadth ratio was 2.5 : 1. The flaps were either from the medial or lateral side. The dissection was carried out in an avascular plane between the deep fascia and the fascia covering the muscle. In the two cases, with chronic osteomyelitis of the tibia, after saucerisation of the osteomyelitic cavity, the bony defect was filled up with gastrocnemius muscle flaps and a skin graft for resurfacing the muscle. The remaining defects, after excision of the unstable scars on the anterior surface of the upper third of the leg was resurfaced by fasciocutaneous flap. The exposed knee joint in one case was covered with fasciocutaneous flap and the remaining defect was covered with split skin graft. In one case of post burn contracture knee, after excision and release of

contracture, neurovascular bundles and tendons were exposed on the posterior aspect of knee, which necessitated resurfacing with a fasciocutaneous flap. The donor defects in all cases were covered with split skin graft. (Fig. I, II a, II b.)

The full thickness defects on the plantar surface of heel were resurfaced with fasciocutaneous flaps from the non-weight bearing portion of instep of the sole based on fasciocutaneous perforators from medial plantar vessels along with a nerve twig. The dissection was carried out between plantar fascia and abductor hallucis and flexor digitorum brevis (Fig. IV. V). The donor defects were skin grafted. The defects on the plantar surface of the great toe were resurfaced with reversed dorsalis pedis island fasciocutaneous flaps. The arterial pedicle was dissected upto first interosseous space and the island of skin paddle tunnelled to reach the plantar surface of great toe. The donor defect was skin grafted.

The follow up of all the cases varied from one to two years. The results were assessed clinically by noting the colour, texture, durability of the flaps and in weight-bearing areas by return of protective sensation.

Observations

Of the fourteen cases under the present study, thirteen were male and only one female patient. All the full thickness defects in male patients were

post-traumatic in nature. The break-up of the cases are shown in (Tab-1).

Out of the fourteen cases, full thickness marginal necrosis was evident in two cases, which required no secondary surgery and healed by conservative method of dressing with antibiotic ointments locally. In the cases of post-burn contracture knee, knee movements recovered fully over a period of eight months. The flaps covering the weight-bearing portions of foot, i.e. the plantar surface of the heel and the plantar surface of great toe, although had some diminished sensation, but never developed any ulceration on walking, because of the return of good protective sensation. The muscle flaps covered with split skin grafts, filling up the bony cavities in tibia, were perfectly stable. (Fig. III a, III b)

Discussion

Since Ponten (1981) put forward the concept of fasciocutaneous flaps to the clinical world in 1981, resurfacing of full thickness defects of leg and foot became simpler and more reliable. Further work on the anatomical aspects, by Haertsch in 1981

and Barclay et al in 1982 delineated the locations of the fasciocutaneous perforators in the leg. Ponten (1981) while publishing his experience with 23 lower leg flaps raised, maintained an average length-breadth ratio of 2.5:1, while Barclay et al (1982) and Tolhurst et al (1983) raised flaps with length-breadth ratio of 3:1. We maintained the ratio of 2.5:1, and observed it to be absolutely safe and adequate. Of his 23 cases Ponten judged his results to be good in 17, fair in 3 and poor in 3. Barclay et al (1982) while publishing their experience of 16 cases, observed 2 cases of marginal necrosis in the flaps, one of them requiring secondary skin grafting. Out of the 14 cases in our present study, 2 cases developed marginal necrosis of the flaps but required no secondary surgery.

Dorsalis pedis-flap in foot has been regarded as an axial pattern flap based on a direct cutaneous vessel (McCraw et al, 1976) But the dorsalis pedis artery lies on the undersurface of the deep fascia and is crossed superficially by the tendon of the extensor digitorum brevis passing to the hallux. Its branches ramify in the deep fascia, and the flap

Table I. Showing break-up of the total cases

S.No.	Clinical Diagnosis	No. of cases	Sex	Site resurfaced	Types of flaps	Results
1.	Fracture tibia with exposure of plate and screws on anteromedial surface of middle third of leg.	4	male	Exposed tibia	Medial fasciocutaneous flap	Good—3 Marginal Necrosis-1
2.	Osteomyelitis tibia with unstable scar upper third of antero-medial surface of leg.	2	male	Saucerised bony cavity and antero-medial surface of upper third of leg	Gastrocnemius muscle flap covered with graft to fill the bony cavity and medial fascio-cutaneous flap to resurface the leg.	Good
3.	Fracture patella with exposed knee joint	1	male	Expose knee joint	medial fascio cutaneous flap.	
4.	Post burn contracture knee	1	female	Back of knee joint	Lateral fascio cutaneous flap.	Good
5.	Full thickness defects of heel with fracture calcaneum	2	male	weight bearing area of heel	Fasciocutaneous flap based on medial plantar vessels from instep of sole	Good-1 marginal necrosis-1
6.	Full thickness defects on plantar surface of great toe	4	male	plantar surface of great toe	Reverse dorsalis pedis fasciocutaneous flap.	Good



Fig. I Photograph showing cloaca in the upper lateral part of tibia, a long unstable scar occupying antero-medial surface of upper third of right leg and multiple ulcers in the lower part of the scar.

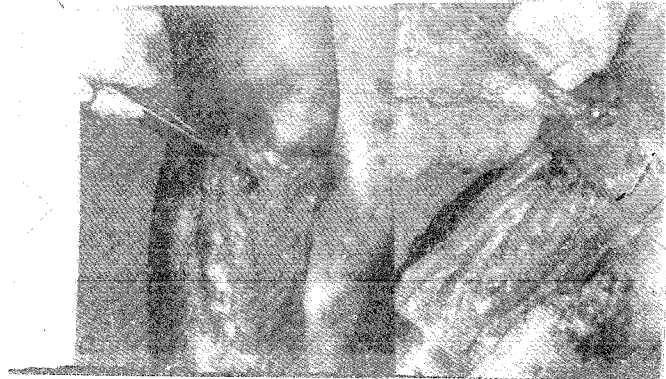


Fig. II. a. Photograph showing the tip of the artery forceps within the saucerised bony cavity of tibia and extent of the defect after excision of the whole scar.

Fig. II. b. Photograph showing the gastrocnemius muscle flap packed into the bony cavity and fascio-cutaneous flap raised to cover the remainder of the defect.

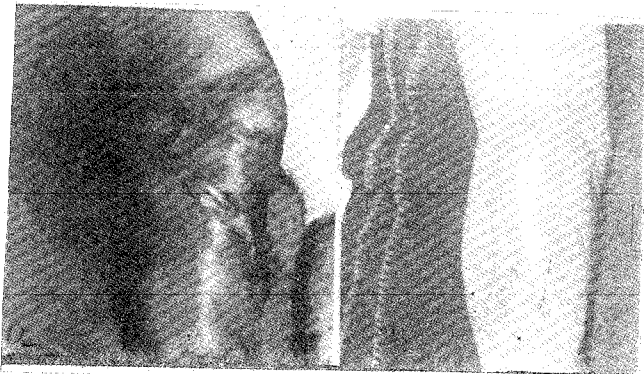


Fig. III a. Photograph in the immediate post-operative period showing the gastrocnemius muscle flap covered with split skin graft and rest of the defect covered with fascio-cutaneous flap.

Fig. III b. Photograph showing six-months post-operative result.



Fig. IV Photograph showing ulcer on the right heel with fracture of calcaneum.



Fig. V Photograph shows excision and re-surfacing by Medial planter fasciocutaneous flap raised from instep of sole.



Fig. VI Same patient. Photograph after 3 months.

is to a large extent fasciocutaneous (Cormack et al, 1987). Roy Chowdhury et al (1988) published their experience of resurfacing great toe with reversed dorsalis pedis island fasciocutaneous flap. In the present study, 4 cases of great toe full thickness defects were resurfaced with this flap, the results of all being good. The medial plantar flap, when first described by Shanshan et al (1979) and Harrison et al (1981), included the abductor hallucis muscle because it was thought to be the principal source of blood supply to the skin of the midsole. But Morrison et al (1983) observed that the same area of skin from the instep of the sole can be raised as a fasciocutaneous flap without the muscle, based only on the cutaneous branches emerging between abductor hallucis and flexor digitorum brevis. Morrison et al published their experience with 4 cases of instep fasciocutaneous flap for resurfacing heel defects. The significance of not including the muscle, they observed were, to inflict less functional and cosmetic deformity at the donor site and prevention of mobility of skin and a feeling of instability when transferred to a weight bearing area. In the present study, 2 cases of full thickness heel defects were resurfaced with medial plantar fasciocutaneous flaps from the non-weight bearing portion of the instep of the sole as local rotation transposition flaps. One of them developed marginal necrosis but required no secondary surgery. None of the flaps developed ulceration on walking in the follow up, demonstrating return of good protective sensation in the flaps. This is in conformity to the conclusion of Morrison et al (1983) who opined that a high degree of sophisticated sensibility was not necessary for function and made conjecture that innate mechanical property of the skin of the sole itself gave the capacity to bear weight and to withstand shear.

All the flaps in the present study were performed as a single staged local rotation-

transposition procedure minimising hospital stay and patient morbidity. The flaps were very reliable. Dissection was very simple between muscle and fascia as was observed by Tolhurst (1983) in a relatively avascular plane — "Surgical plane" (Haertsch, 1981). The flaps were less bulky, making transposition considerably easier as concluded by Tolhurst (1983) and hence satisfactory aesthetic results. The underlying muscle was left intact and accepted split skin grafts readily, hence no functional impairment as was concluded by Tolhurst. There was no chance of muscle atrophy and no motor or contour deficit. Barclay et al (1982) observed that scarring around the defect from gravitational ulceration or skin grafts on old burns did not preclude the use of the flap, viability and survival depending only on the undisturbed relationship of the mobilised fascia and integument. In the present study, we resurfaced one full thickness defect on the posterior aspect of knee as a consequence of release of postburn knee contracture with a proximally and laterally based fasciocutaneous flap with good result.

Conclusion

Fourteen cases of full thickness defects of leg and foot were resurfaced with fasciocutaneous flaps in the present study. The results were good in twelve cases with satisfactory cosmetic results. None of the six flaps in the weight bearing portion of great toe and heel, developed any ulceration on walking in the follow-up study and had satisfactory protective sensation. The resurfacing technique with the fasciocutaneous flaps in full thickness defects of leg and foot is, therefore, a good reliable and simple procedure and minimises hospital stay and patient's morbidity when performed as a single-staged local rotation-transposition flap. These flaps have become the method of first choice in our institution in these specific situations.

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