

OUR CLINICAL EXPERIENCE WITH THE TENSOR FASCIAE LATAE MYOCUTANEOUS FLAP

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The use of muscle together with the overlying skin as a compound flap was described by Owens (1955) for the repair of defects in the face. Since then, there has been an increasing realisation of the value of musculocutaneous flaps and the contribution of the perforating vascular branches from the muscle to the overlying skin. Many such flaps have now been described and their vascular basis investigated (McCraw *et al.*, 1977).

One flap which McCraw did not include and which has received less attention than most, is the tensor fasciae latae flap (TFL). Bailey (1967) reported the use of this musculocutaneous flap to close an acetabular defect. Wangenstein (1934) used the fascia lata as a pedicled flap, without the overlying skin, to repair large hernial defects. More recently, an extensive survey of the use of the T.F.L. flap has come from Atlanta, U.S.A., (Hill *et al.*, 1978; Nahai *et al.*, 1978; Bostwick *et al.*, 1979). These authors have used the flap in the repair of ischial and trochanteric pressure sores where they found it safe, reliable and easy to perform. It could also be used to close co-existent ischial and trochanteric pressure sores and when rotated anteriorly could reach defects in the perineum, groin and lower abdomen (Bostwick *et al.*, 1979, Nahai *et al.*, 1979).

The value of transposing muscles in the repair of tissue defects has been well established (Pers and Medgyesi, 1973). The transposition of various muscles (but not tensor fasciae latae) with split skin grafting of the muscle belly was advocated by Ger and Levine (1976) in the treatment of decubitus ulcers. The increased vascular supply to the area of repair helped to combat any residual infection and the muscle bulk provided

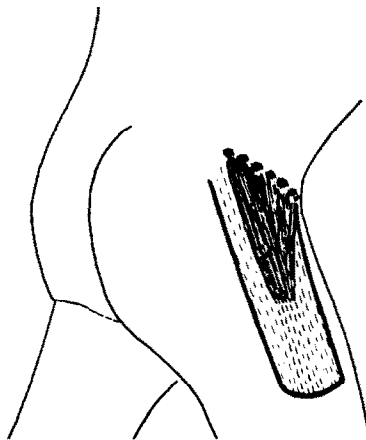


FIG. 1. A diagram to illustrate the outline of a T.F.L. flap of average dimensions (solid line) and its components, fascia lata (broken lines) and muscle (triangular area).

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excellent padding. On the other hand, the dissection of the muscles they used was somewhat traumatic and the wounds, whether grafted immediately or closed directly over the muscle, were slow to heal.

The transfer of an easily dissected musculocutaneous flap would thus appear to have definite attractions, particularly in the repair of pressure sores. Our results and observations on a series of cases treated since 1978 are described.

ANATOMY AND OPERATIVE TECHNIQUE

The anatomy and structure of the T.F.L. flap have been well described and illustrated by Hill *et al.* (1978). The muscle is broad and flat, originates from the anterior iliac crest, and is inserted into the iliotibial band by way of the fascia lata. The vascular pedicle enters the deep surface of the muscle about 6 cm distal to the anterior iliac crest and the vessels are relatively large for such a small muscle. There are two venae comitantes and the arterial supply comes from the lateral circumflex femoral artery. Latex injection studies have shown that the descending branches of the axial musculocutaneous perforators supply not just the skin over the muscle, but extend beyond to supply skin of the anterolateral mid and lower thigh.

The surface markings of the flap and its components are shown (Fig. 1). The length and breadth required depends on the position and size of the defect to be closed (Fig. 2).

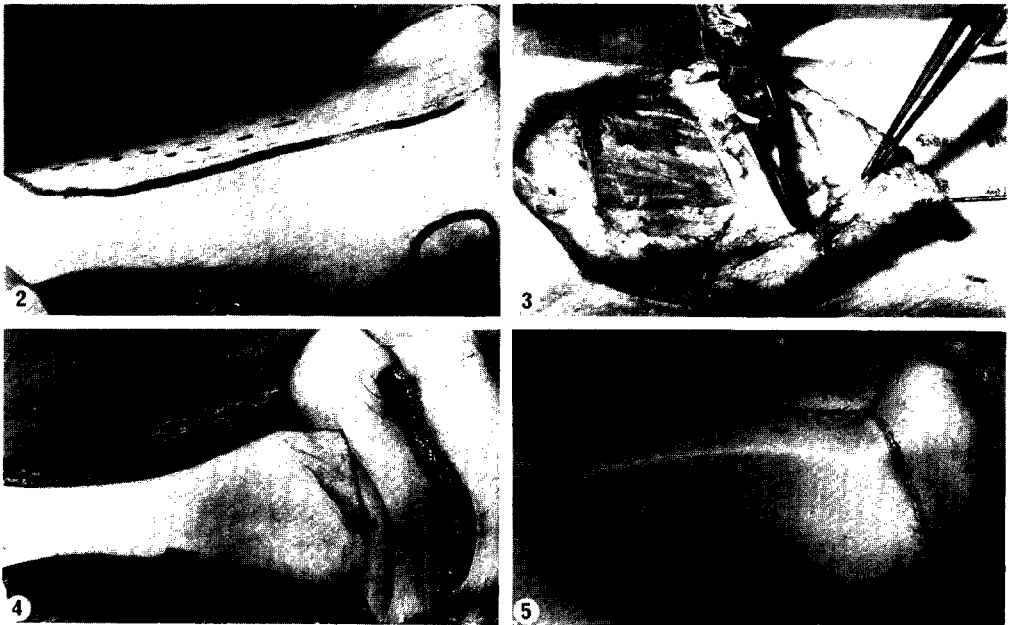


FIG. 2. A long T.F.L. flap has been outlined on the thigh of a patient with an ischial pressure sore. The area of undermining around the sore is also marked prior to excision. Note the scar over the trochanteric area from previous surgery.

FIG. 3. Flap elevation begins distally. The fascia lata is incised at this level, elevated and sutured to the subcutaneous tissue at the end of the flap.

FIG. 4. Flap elevation completed and flap transposed. The bridge segment of skin intervening has been incised to allow the flap to reach the ischial defect. This is probably safer than tunnelling a de-epithelialised portion of the flap under the bridge segment.

FIG. 5. The operation completed with direct closure of the thigh defect, suction drainage and no dressings. Patients were usually nursed post-operatively on low air-loss beds.

Raising of the flap begins distally and elevation proceeds easily with little bleeding or trauma. To prevent separation of the skin from the underlying fascia lata, it is helpful to suture the fascia to the subcutaneous tissues at the distal end of the flap (Fig. 3).

Once raised, the flap is then transposed into the required position (Fig. 4). When the flap is not being used as an island flap, there is no need to expose the vascular pedicle, which emerges between the vastus lateralis and rectus femoris. It is usually possible to close the donor area in the thigh by primary suture (Fig. 4).

When the T.F.L. flap was used in the treatment of pressure sores, the general medical condition of the patient as well as any local infection was controlled as far as possible prior to operation. Where applicable, the "pseudo tumour" excision technique (as described by Guttman, 1953) was employed in the excision of the sore, associated granulation tissue and reduction of bony prominences.

RESULTS AND DISCUSSION

We have used 16 T.F.L. musculocutaneous flaps in 13 patients (Table I). The majority of these were paraplegic, as in the series reported from Atlanta (Nahai *et al.*, 1978).

TABLE I

Distribution, aetiology and complications in 16 tensor fasciae latae myocutaneous flaps

Cause	Site	Total	Donor area grafted	Complications
Paraplegic pressure sore	Trochanteric	13	2	None
Paraplegic pressure sore	Ischial	2	0	Terminal necrosis
Tissue necrosis	Groin	1	0	None



FIG. 6. A small area of superficial necrosis occurred at the tip of the flap illustrated in Fig. 5.

FIG. 7. In the second patient, in whom an ischial sore was repaired with a T.F.L. flap, an area of necrosis occurred at the distal end. On the right side, a gracilis myocutaneous flap had been used to close an ischial sore on a previous occasion. This patient had psoriasis.

FIG. 8. A T.F.L. flap has been used to repair a recurrent trochanteric pressure sore. Previously a posteriorly based thigh skin flap had been used with grafting of the secondary defect.

In our series, the majority of the patients had trochanteric sores; only two out of the cases had ischial ulcers. Unlike Nahai *et al.* (1978), we have neither used the muscle alone nor used the flap as a free flap.

We can confirm the ease of design, elevation, and relatively trouble-free healing of the T.F.L. flap. Indeed, the excellent vascularity has in our opinion greatly increased the rate of healing and made the nursing care much easier than with some of the other flaps used for closure of trochanteric sores. In one patient, with large bilateral sores and nursed on a low air loss bed, it was possible to repair each with T.F.L. flaps within a period of six weeks and allow the patient to lie on the flap used in the first repair while the second was healing.

The shorter flap used for trochanteric sores appeared to be extremely reliable. In all cases, healing occurred without complications. This could not be said for the longer flaps used for closure of the ischial sores, even though in neither of the two cases was there complete loss of the flap. In both, there was an area of necrosis at the distal end, minor in one (Fig. 6), but somewhat larger in the other (Fig. 7). It should be noted that

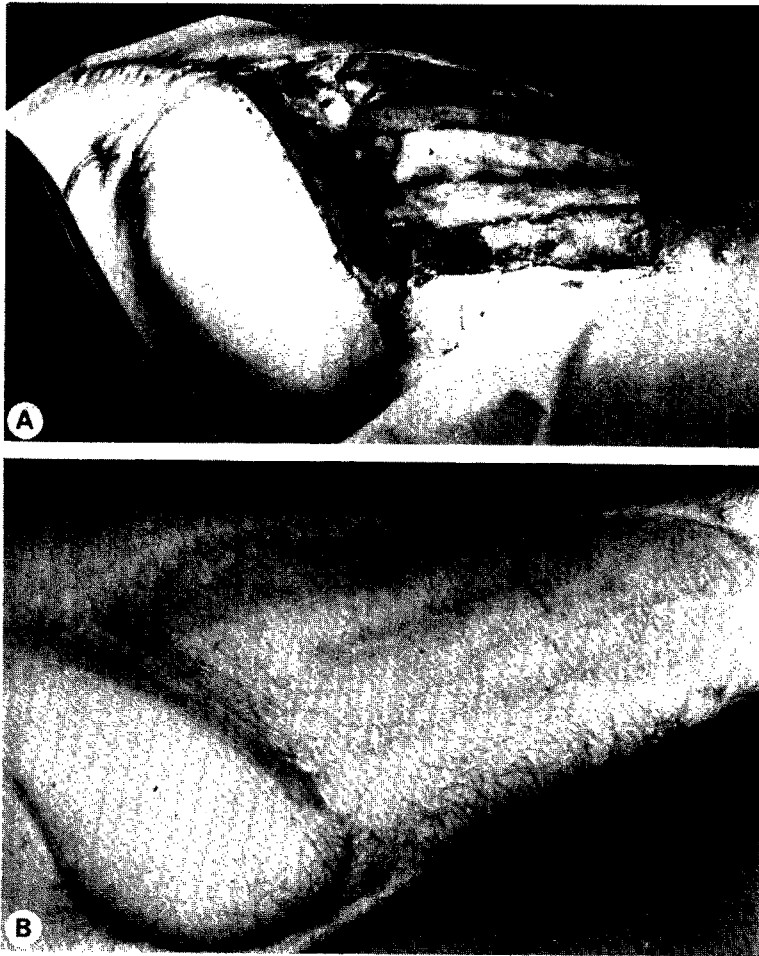


FIG. 9. A. Grafted donor area and T.F.L. flap used for a trochanteric sore. This patient had extensive soft tissue calcification and the flap had been "delayed" because of concern about its viability. B. Well healed flap and donor area three months later.

in the latter case, a gracilis myocutaneous flap had been used successfully to close a similar ischial sore on the other side. We have in fact used the gracilis myocutaneous flap to close ischial pressure sores on two other occasions without any problem. Bostwick *et al.* (1979) who once believed the gracilis flap to be more reliable now admit that the tensor fasciae latae flap is superior. From our limited experience so far, we are not so sure.

There is no doubt that the dissection of the T.F.L. flap is much easier and the available dimensions are greater. The limits in terms of length and width have still to be defined. In addition if necessary, it should still be possible to use a medially based posterior thigh flap to close a recurrent ischial sore or to use a T.F.L. flap when a posterior thigh flap has previously been used (Fig. 8). This would be more difficult, if not impossible, with a gracilis myocutaneous flap.

The majority of the donor areas in our series were closed directly and healed well (Table I). In part, this was due to the muscle wasting that occurs in paraplegics. Closure could be difficult in non-paraplegics, in obese patients, where other operative scars are present and if a very broad flap is raised. The average width of the flaps raised in our series was about 8 centimetres.

Excessive calcification in the soft tissues is a recognised occurrence in some paraplegics but is of uncertain aetiology. This was present in one of our cases and led to considerable problems in elevating the flap, transposing it into the defect and closing the donor area. The flap had to be delayed and the whole donor area grafted (Figs. 9A and B). Provided the grafted area is not subject to pressure from calipers, or other forces, then failure to close the thigh defect area directly should not be a major disadvantage.

The most difficult part to close is usually at the superior end just below the inferior border of the transposed flap (Fig. 10). It would seem that apart from grafting, closure in this area can be facilitated by either designing a racquet-shaped skin portion of the flap (Fig. 11), or by increasing the flexibility by making an island flap (Fig. 12).

In 9 out of the 15 T.F.L. flaps used for pressure sores, previous scars indicated

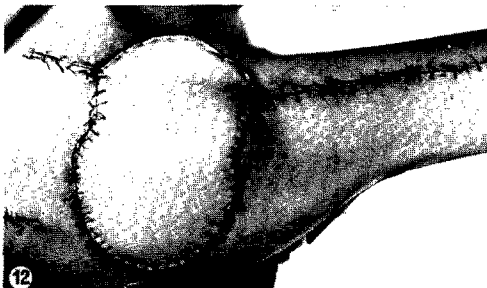
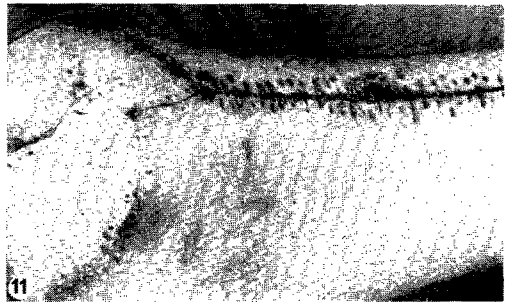


FIG. 10. The area just at the apex of the donor area in the thigh is usually the most difficult to close. In this case, grafting of a small defect was required.

FIG. 11. By designing the skin portion of the T.F.L. flap to have a narrow neck, closure of the donor area may be made easier.

FIG. 12. Increased tissue mobility may also be obtained by designing an island T.F.L. flap as shown here.

surgery either for the ulcer in question or for others. One of the advantages of the improved blood supply of the musculocutaneous flap is that the presence of scars does not restrict its use as could be the case if the flap was a random pattern skin flap. This is supported by the fact that no flap has so far been lost.

It should be remembered that the T.F.L. flap can easily be transposed anteriorly (Hill *et al.*, 1979). While we have so far only done this once (Fig. 13), there could well be a use for the flap in the reconstruction of defects in the groin and lower abdominal wall. Amongst other advantages the T.F.L. flap in these situations could provide vascularised fascia lata. Finally, since the muscle itself is only an accessory muscle of thigh flexion and rotation, it is unlikely that any significant disability will ensue following the use of the T.F.L. flap in non-paraplegics.



FIG. 13. An anteriorly rotated T.F.L. flap has been used to cover a defect in the groin following tissue necrosis after extravasation of bicarbonate solution. The flap is almost an island flap with a 1 cm skin base at the supero-lateral corner.

SUMMARY

The tensor fasciae latae musculocutaneous flap is confirmed to be an easily designed and reliable flap. It is especially useful in the closure of trochanteric pressure sores, and has potential value in the repair of defects in the groin and lower abdomen. The gracilis flap is possibly more useful for closure of recurrent or large ischial sores, but the limits and dimensions of both flaps require further investigation.

Closure of the donor area in the thigh may be difficult especially where excessive tissue calcification is present. Modification of the design of the flap may help to reduce the defect before closure.

The rapidity of healing associated with the excellent blood supply to the T.F.L. flap renders it very safe and makes nursing care post-operatively relatively trouble-free.

We would like to thank Mrs Hamilton for secretarial assistance, Mr Franklyn and his staff of the Medical Illustration Department, Bangour, for production of the photographs, and Sir Ludwig Guttman, Editor of Paraplegia, for permission to use photographs already submitted for publication (Figs. 1 to 5).

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