

MUSCLE FLAPS IN THE REPAIR OF SKIN DEFECTS OVER THE EXPOSED TIBIA

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DEFECTS of the lower leg exposing bare tibia are difficult to cover in elderly or debilitated patients. Cross leg flaps and tube pedicles are unsatisfactory while bipedicle and rotation flaps are liable to necrosis. Ger (1968, 1971) and Pers and Medgyesi (1973) have shown how muscle flaps may be transposed over the exposed bone and still retain sufficient vitality to accept a free skin graft. They used mainly the posterior crural group of muscles. We wish to present the use of the 3 main anterior crural muscles, the tibialis anterior, the extensor digitorum longus and the extensor hallucis. The tibialis anterior becomes tendinous at the junction of its middle and lower thirds. The extensor hallucis and extensor digitorum longus remain muscular to the level of the malleoli. Thus there is a continuous sheet of available muscle stretching from the tibial tuberosity to the level of the malleoli (Fig. 1).

ANATOMICAL CONSIDERATIONS

The bony origin of the tibialis anterior stretches from the lateral tibial condyle above to about halfway down the lateral side of the tibia (Fig. 2). Its major origin, however, is from the interosseous membrane. The bony origin may be completely

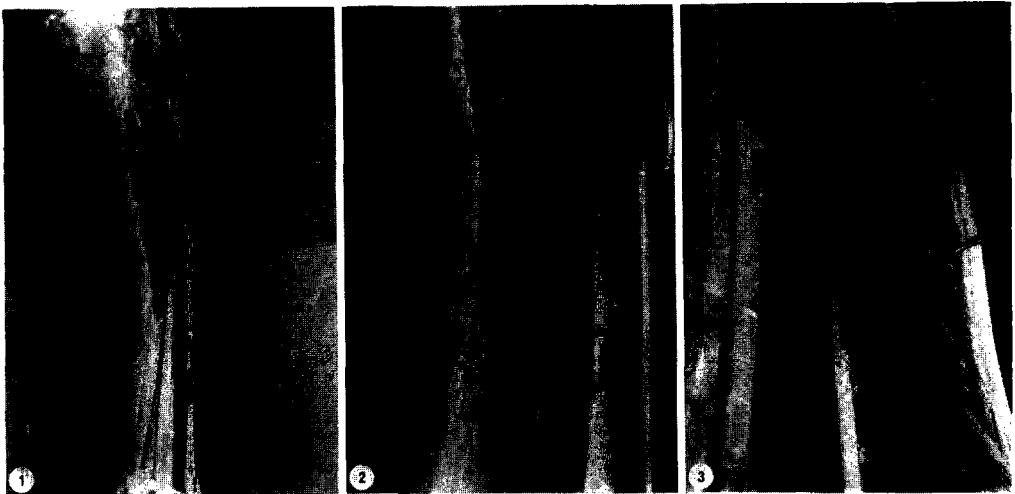


FIG. 1. The anterior crural muscles. The tibialis anterior is fleshy in the upper two-thirds of the leg, the extensor digitorum and extensor hallucis in the lower third.

FIG. 2. The bony origin of the tibialis anterior shown here may be fully divided in order to free the muscle for transposition.

FIG. 3. Segmental perforating branches of the anterior tibial artery passing through the extensor hallucis to the extensor digitorum. In transposition procedures these muscles are treated as a single entity.

divided and the membrane origin partially mobilised so long as the anterior tibial artery which supplies the muscle segmentally is not damaged.

The extensor digitorum and extensor hallucis muscles have a continuous origin from the lateral tibial condyle, the extensor surface of the upper three-quarters of the fibula and the interosseous membrane. They can be regarded as one sheet of muscle and not separate entities. Their blood supply also comes segmentally from the anterior tibial vessels (Fig. 3).

The anterior tibial vessels lie deeply on the interosseous membrane between the tibialis anterior and the extensors. The segmental supply means that the muscles may be transected safely at any level so long as the main vessels are intact. The main vessels may also be partly mobilised with the muscle mass.

TECHNIQUE

In order to transpose the tibialis anterior it is necessary to chisel or saw off the sharp anterior border of the tibia if this has not already been removed as, say, in the excision of a tumour (Fig. 4). The muscle is then detached from its bony origin and freed from the interosseous membrane as far as necessary for easy transfer; it can be used to cover any defect over the upper two-thirds of the tibia.

In lesions of the lower one-third, the extensor hallucis and extensor digitorum tendons are divided below the inferior extensor retinaculum. They are mobilised from

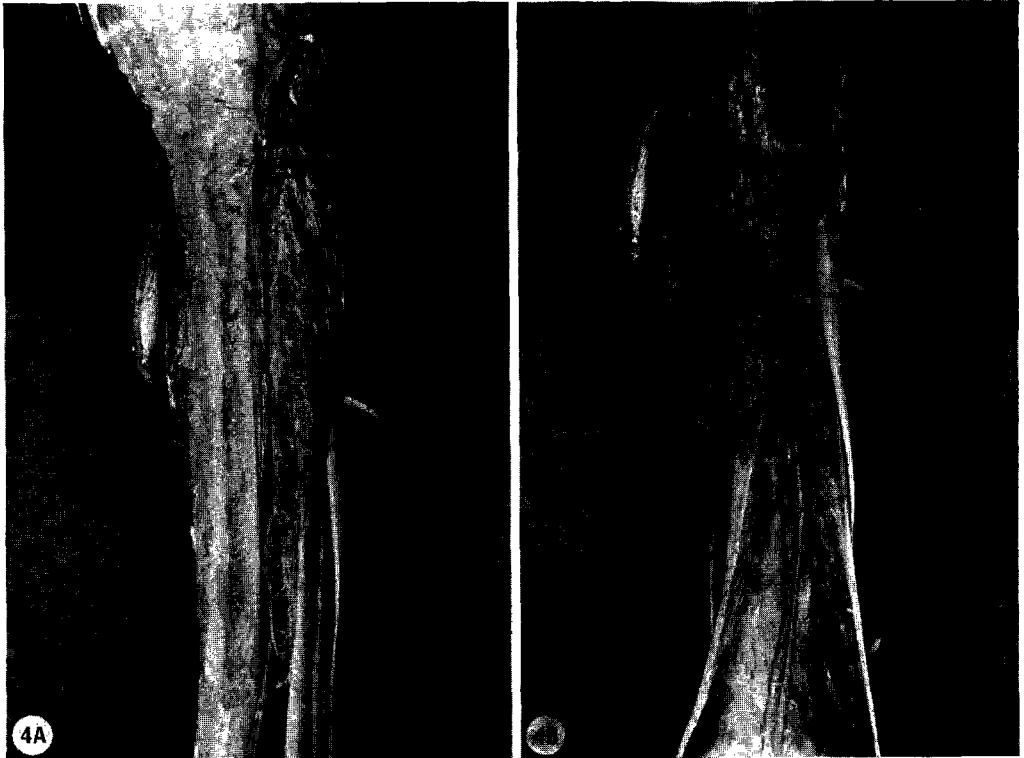


FIG. 4. A, The sharp anterior border of the tibia has been excised and the tibialis anterior mobilised. B, The muscle transposed. With living muscle much further transposition is possible than in this fixed specimen.

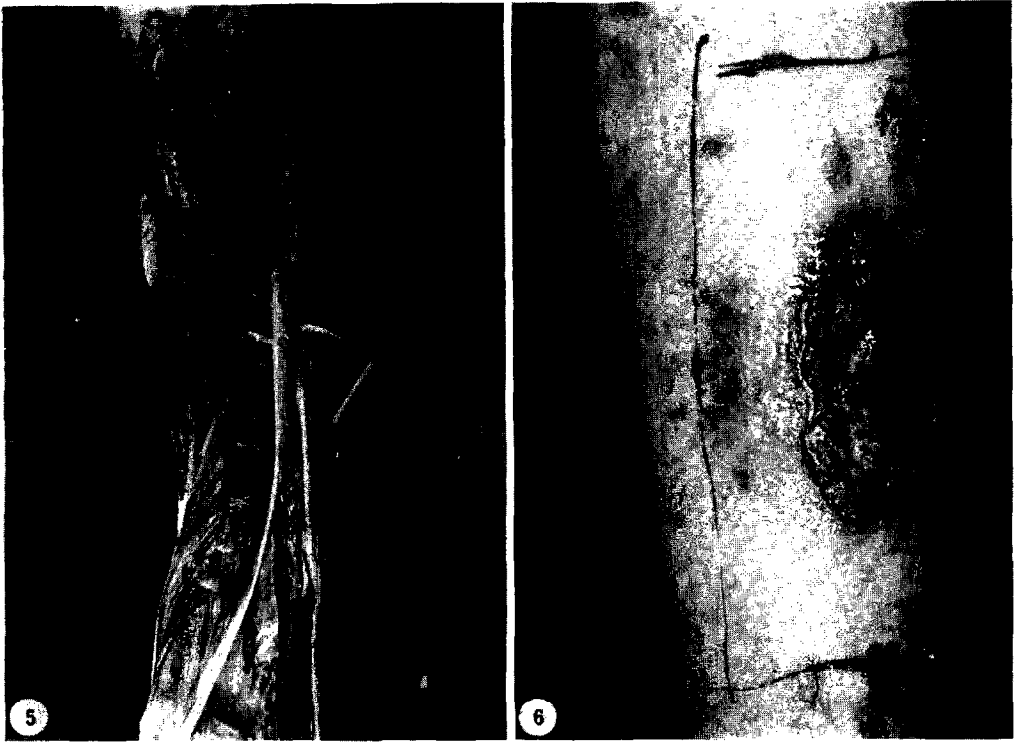


Fig. 5. Extensor hallucis and extensor digitorum transferred over the lower one-third of the tibia.

FIG. 6. Case 1. Squamous carcinoma fixed to the tibia in a 72-year-old lady.

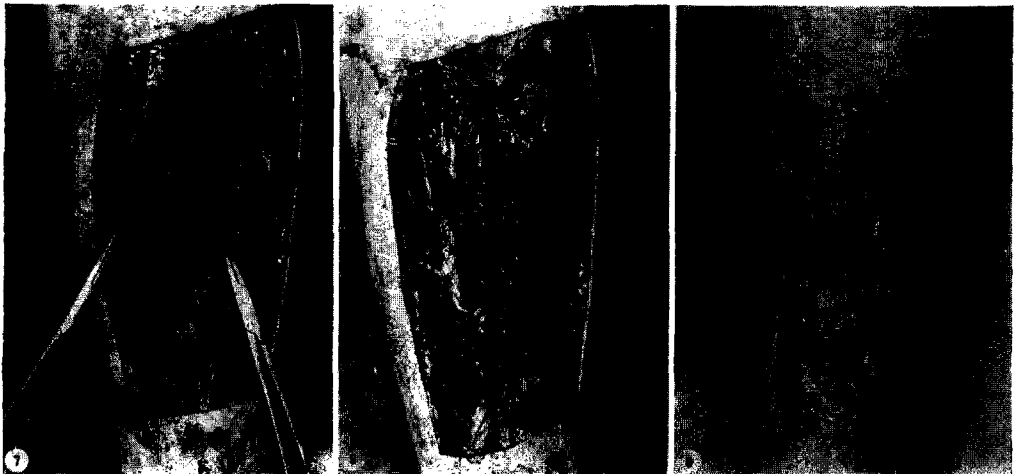


FIG. 7. Case 1. Extent of the excision of soft tissue and bone.

FIG. 8. Case 1. Tibialis anterior mobilised, transposed and about to be split skin grafted.

FIG. 9. Case 1. Healed result.

their origin as one continuous sheet of muscle for a suitable distance to allow easy transfer. The distal ends of the cut tendon may be sutured to the tibialis anterior tendon but this does not seem to be necessary. It is not usually necessary to remove the anterior border of the tibia (Fig. 5).

In defects involving the whole length of the tibia all 3 muscles may be mobilised for cover.

ILLUSTRATIVE CASES

Case 1. A 72-year-old lady had the squamous carcinoma shown in Figure 6. It was firmly fixed to the underlying tibia. After excision of the tumour and the affected bone (Fig. 7) the tibialis anterior was mobilised and transposed (Fig. 8). A split skin graft applied to its surface took well (Fig. 9).

Case 2. A 20-year-old man was admitted with the ulcerated unstable scar shown in Figure 10. It was the result of a fracture of the lower third of the tibia and fibula sustained 2½ years before.

The area was fully excised, some necrotic bone removed and the extensors digitorum and hallucis transposed (Fig. 11). A split skin graft on the muscle resulted in firm healing (Fig. 12).

DISCUSSION

Many methods of treating exposed tibia are in common usage, including conservative treatment, bone drilling followed by grafting, simple grafting after chiselling down to living bone, and various flaps.

All have their advantages and disadvantages and none may necessarily be abandoned for the current technique. The muscle flap, however, with superimposed free graft is

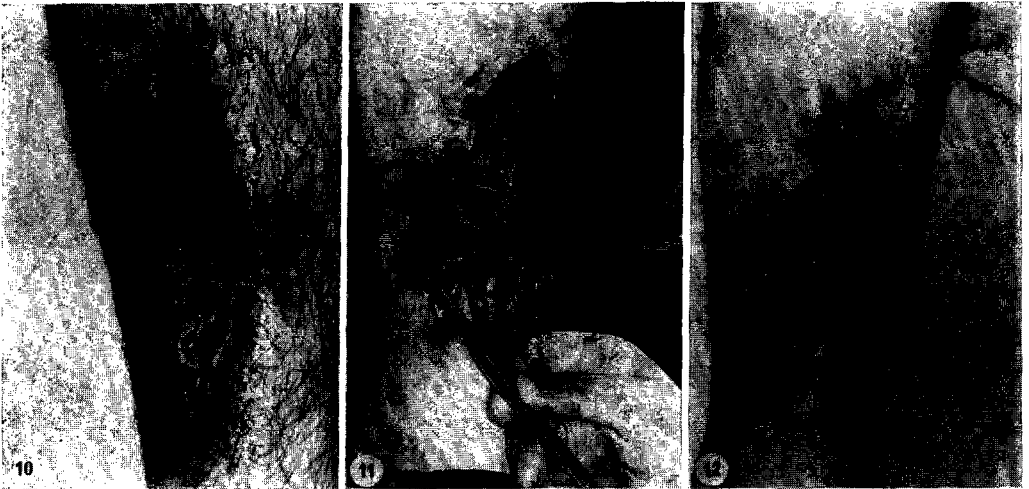


FIG. 10. Case 2. Ulcerated scarred area over the lower third of the tibia resulting from a fracture of both bones 2½ years before.

FIG. 11. Case 2. Extensor digitorum and extensor hallucis mobilised. Note how much transposition is possible.

FIG. 12. Case 2. Result 1 week after muscle transposition and split skin grafting.

simplicity itself, with minimal complications and the shortest hospital stay. It was felt initially that drop foot complications would arise but this did not happen.

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