

Anterolateral leg island flap

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Summary—Three anterolateral leg island flaps based on the septocutaneous vessels of the anterior crural intermuscular septum were successfully transferred. The anterolateral leg island flap is thin, reliable and relatively easy to raise. It is extremely useful for covering the knee and the upper half of the leg.

In this report we present a new anterolateral leg island flap based on the septocutaneous vessels of the anterior crural intermuscular septum.

Anatomy

The septocutaneous arteries in the anterior intermuscular septum of the leg have been reported by Carriquiry *et al.* (1985) but standard textbooks on anatomy have yet to describe this finding. We investigated it using six freshly amputated limbs, cadavers and four clinical cases.

The septocutaneous artery in the anterior crural intermuscular septum between the extensor digitorum longus and peroneus longus originates from the anterior tibial artery anywhere between 7 and 11 cm below the head of the fibula. Accompanied by its venae comitantes and by the superficial peroneal nerve, it passes downwards and superficially. It runs in the septum in the upper third of the leg, under the fascia in the middle third (Fig. 1) and above the fascia in the lower third. It gives off one cutaneous branch in the middle of the leg, which is sometimes larger than the artery which runs with the superficial peroneal nerve, and has communicating branches to the peroneal artery in the lower third.

The artery was a constant finding in all our dissections. Dye injection stained an area of skin on the lower leg, with a maximum size of 10 × 14 cm (Fig. 2). The anterior border of the stained area was the crest of the tibia and its posterior border overlay the fibula.

Operative procedure

The flap is designed in the lower half of the leg with its axis the anterior intermuscular septum. The

surface marking of the anterior intermuscular septum is a line drawn from the head of the fibula to the lateral malleolus. In thin patients it is palpable as a linear depression. We have found the flap to be more reliable when it includes the



Fig. 1

Figure 1—The septocutaneous vessels of the flap can be seen under the fascia.



Fig. 2

Figure 2—Dye injected into the septocutaneous artery in the anterior crural intermuscular septum. A 10×4 cm section of the skin has been stained. Marks show the head of the fibula and lateral malleolus.

cutaneous branch in the middle of the leg. The first step is to find the neurovascular bundle at the distal margin of the flap. The superficial peroneal nerve is large but the septocutaneous artery is small. The vessels are dissected from the nerve, which is preserved. The flap includes the deep fascia and is elevated with the vessels, starting distally. The vascular pedicle, including the septum, can be dissected to its origin from the anterior tibial artery between 7 and 11 cm below the head of the fibula. The exposed nerve is covered by the muscles from each side. The donor defect is directly sutured when it is narrower than 3 cm, but if it is wider a skin graft is applied.

Case reports

Case 1. A 60-year-old man sustained open fractures of both legs. Ender pin fixation and bipedicle flap transfer had been performed on the right leg and the transferred flap had become necrotic. An 11×8 cm anterolateral island flap with a 6 cm long pedicle was used to close the defect and a skin graft was applied to the donor defect. The transferred flap fitted well and survived completely (Fig. 3).

Case 2. A 17-year-old man suffered an open fracture and loss of soft tissue from the left leg. A 7×3 cm anterolateral leg island flap with a 7 cm long pedicle was transferred and the donor site was sutured directly. The postoperative course was uneventful, the transferred flap surviving well along with good bone union (Fig. 4).

Case 3. A 62-year-old man sustained a compound fracture of the right leg due to a traffic accident. Three bone grafting procedures were performed. Skin necrosis occurred after the last operation in the middle third of the leg. A 10×6 cm flap with a 9 cm long pedicle was elevated and included a major cutaneous branch of the septocutaneous artery which was given off in the middle of the leg. The transferred flap survived completely (Fig. 5).

Discussion

Many flaps have been described to cover defects of the leg. We have used mainly gastrocnemius muscle and musculocutaneous flaps (McCraw *et al.*, 1978) or the peroneal flap (Yoshimura *et al.* 1984) for reconstruction of the knee and upper half of the leg. We have found that the gastrocnemius flap is bulky and that operative procedures involved in transferring a peroneal flap are relatively difficult. We feel, therefore, that the anterolateral leg island flap clearly exhibits several advantages: (i) the flap is thin, (ii) the operative procedure is easy, (iii) the operative position is supine, and (iv) the flap is completely reliable.

Haertsch in 1981 described two axial-type vessels of the leg. They were the saphenous artery and cutaneous branches of the popliteal artery which follow the sural nerve, but he did not mention the septocutaneous vessels in the anterior crural intermuscular septum*. In his illustration of the vascular territory of the peroneal artery we observed an unstained area resembling an island. We now believe that this territory is being supplied by the septocutaneous artery which we have described in this report and which is one of those described by Carriquiry *et al.* in 1985. From our experience, we

* He did describe perforators in this area. (Ed.)

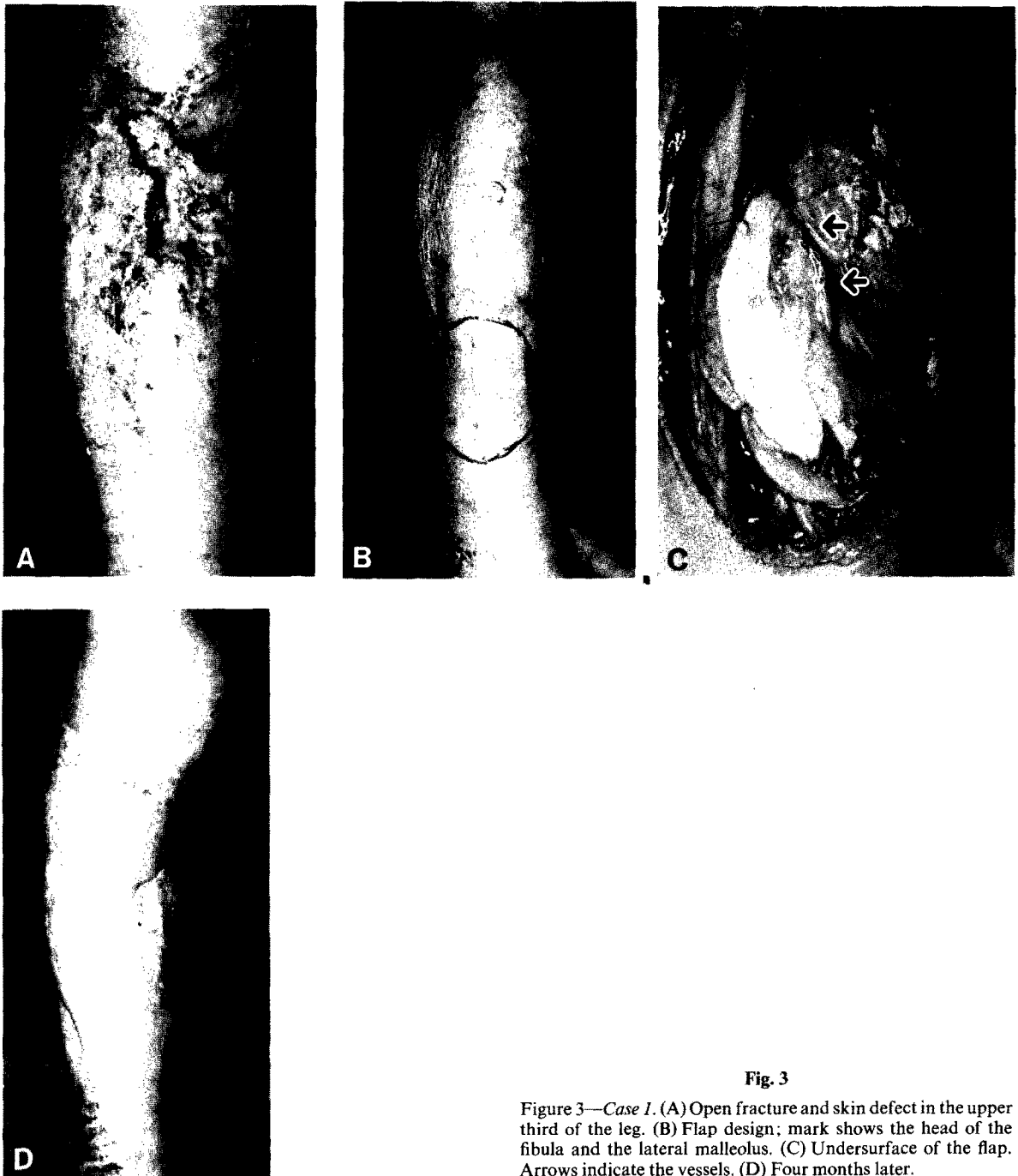


Fig. 3

Figure 3—*Case 1.* (A) Open fracture and skin defect in the upper third of the leg. (B) Flap design; mark shows the head of the fibula and the lateral malleolus. (C) Undersurface of the flap. Arrows indicate the vessels. (D) Four months later.

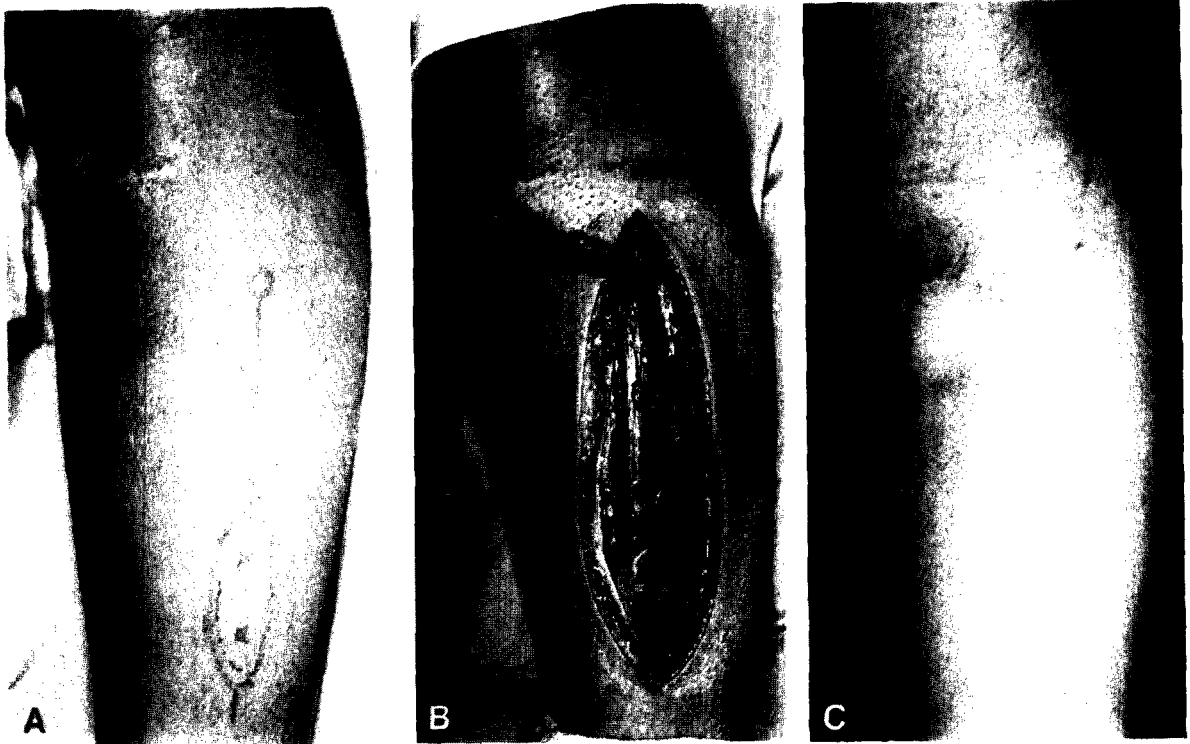


Fig. 4

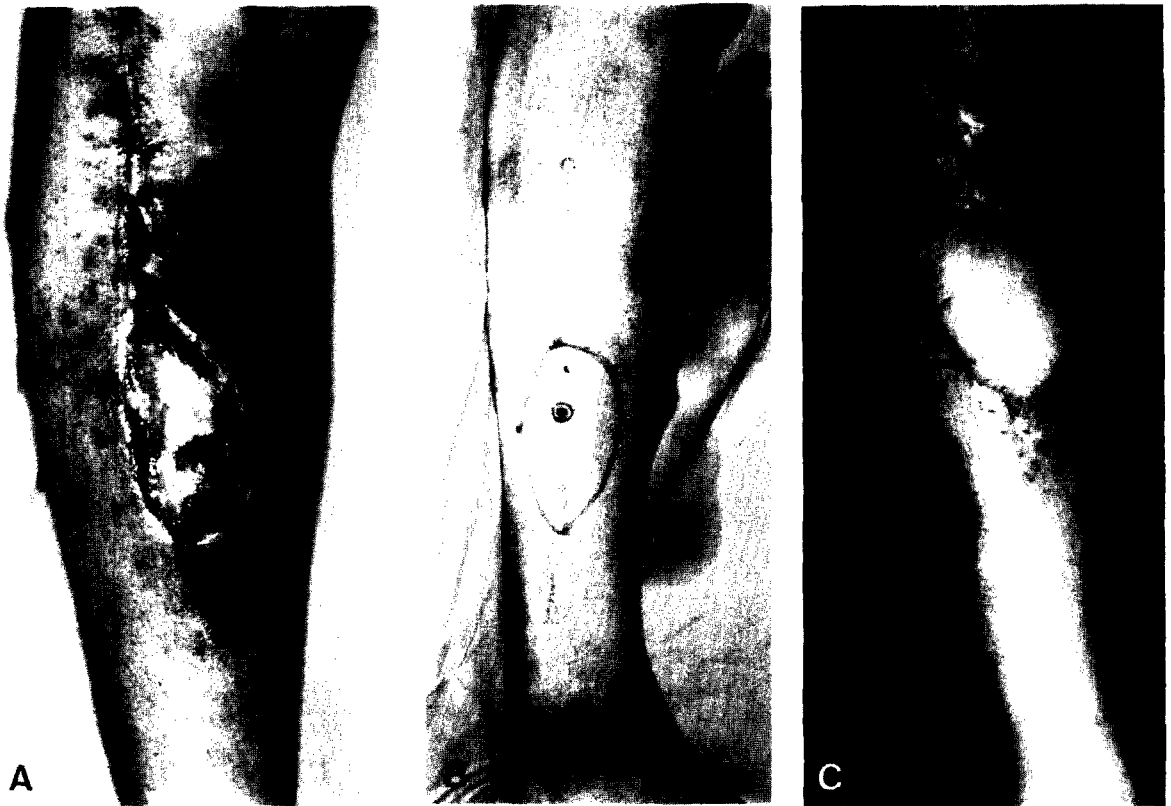


Fig. 5

Figure 4—Case 2. (A) Skin defect and flap design. (B) The elevated flap. (C) Two months later. Figure 5—Case 3. (A) Skin defect of the middle third of the leg. (B) Flap design. (C) Two months later.

believe that this vessel is constant and can support an island flap which is reliable and extremely useful in the reconstruction of the knee and upper half of the leg.

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