Application of Forearm Island Flap to Repair of Hand Injury

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Since September 1982, 15 patients have been treated with the forearm island flap for repair of soft tissue defect of the hand in one stage with satisfactory results.

CLINICAL MATERIAL
In our series there were 15 patients, 7 males and 8 females, aged 11-35 years. In 3 of them the soft tissue injury was fresh (1 on the dorsum of the hand, 1 on the palmar aspect of the thumb, and 1 on the thumb and thenar prominence), while in the other 12 the trauma was old (3 had contraction of the first web of the hand; 3 had protruding first carpal bone; 2 had scars on the dorsum of the hand; 2 had scars on the palmar aspect of the index finger, the ring finger and the little finger respectively; 1 had loss of soft tissue on the ulnar side of the thumb with exposed interphalangeal joint; 1 had hemangioma of the thumb).

The largest flap was 6 × 16 cm, and the smallest was 3 × 5 cm. 5 of them were taken from the left forearm, and 10 from the right. The vessel pedicles of the flaps were usually 5—6 cm in length, the shortest being 2 cm, and the longest 8 cm. The distally situated vessel pedicles turned 130—180 degrees with the flaps rotated distally to the hand. In 12 cases the flaps passed through a subcutaneous tunnel to reach the recipient site. Only in 3 cases of the scar on the palmar aspect of the fingers was the passage formed by an incision made between the flap and the recipient region. The donor areas in 9 cases could be closed by direct approximation and 6 by split-skin grafts.

The island flaps in all cases survived in their entirety; in 2 cases the flaps became markedly swollen on the first day after operation with vesicle formation on the skin but the swelling subsided in 3—5 days.

OPERATIVE TECHNIQUE

1. The design of the forearm island flap

It is necessary to measure the size of the recipient site and the least distance from the recipient region to the pulse of the radial artery in the wrist crease which is the required length of the vessel pedicle. 1 cm is added to this length for allowance of retraction of the blood vessel and is outlined from the wrist crease proximally along the radial artery, and then the flap is outlined along the radial artery as shown in fig.1. The dimension of the flap should be made 1—2 cm larger than the defect region. If the width of the flap is less than 5 cm, the cephalic vein may not be included in the flap.

2. Procedure

Brachial plexus nerve block anesthesia.
Pneumatic tourniquet cuff is applied to the upper arm.

(1) The ulnar side of the flap is
incised, and the radial artery with its accompanying veins is immediately seen after dissecting radially under the deep fascia. The branches from radial artery to the muscles are tied. The flap containing radial artery and vein can be raised.

(2) The radial side of the flap is then incised, and the subcutaneous superficial veins are tied. The brachioradial muscle with its tendon lies just beneath the deep fascia, and the dissection is carried out ulnarly along the superficial surface of the tendon. The adjacent tissue around the vessels should be preserved as much as possible. The flap is undermined to join the ulnar and radial incisions just beneath the vessel bundle.

(3) The incision of the flap is completed, and the radial artery and vein are dissected together distally to the wrist crease. At this time the flap is separated from adjacent tissue and is only connected with the radial artery and vein (fig.2). The proximal end of the vessel bundle of the flap is temporarily interrupted with non-traumatic clamp. The tourniquet is released, and the blood circulation of the flap and the hand is carefully observed.

(4) The scar tissue of the recipient site is removed, and the subcutaneous tunnel between the recipient region and the vessel pedicle is created.

(5) The proximal end of the vessel bundle of the flap is cut off and tied, and the flap is rotated distally, passing through the subcutaneous tunnel to reach the recipient site (fig.3). Precaution must be taken to avoid kinking of and pressure on the vessel pedicle. The edge of the flap is sutured to the border of the recipient defect. Rubber sheet drainage is placed under the flap. The defect of the donor site is closed either by suturing or by a split-skin graft. The forearm and the hand are fixed with a plaster cast with a portion of the flap exposed for observation of its blood circulation.

(6) If the injury is fresh, the design and dissection of the flap are made according to the size of the skin defect after cleansing of the wound.

3. Postoperatively the operated limb is elevated and antibiotics are given to prevent infection. Fig.4 shows excellent flap appearance.

DISCUSSION

1. The forearm flap is supplied by the fine cutaneous branches from the radial artery, and is drained by the superficial