

Clinical Paper
Reconstructive Surgery

Local full-thickness skin graft of the donor arm—a novel technique for the reduction of donor site morbidity in radial forearm free flap

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Abstract. A novel technique to reduce donor site morbidity after radial forearm free flap (RFFF) harvest, using a local full-thickness skin graft (FTSG), is described. Thirty consecutive patients undergoing RFFF for head and neck reconstruction were enrolled in a prospective study. Donor site defect closure was performed with spindle-shaped FTSGs excised from the wavelike skin incision made for the vascular pedicle. Both the removal site of the FTSG on the volar forearm and the covered RFFF donor site healed uneventfully in 29 cases, with no impairment of function related to the skin graft. No skin graft failure and no exposure, tenting, or adherence of the flexor tendons occurred. All patients expressed satisfaction with postoperative pain, the functional outcome, and cosmetic appearance. Primary donor site defect closure could be achieved in all cases with the use of a local FTSG. This graft can be gained at the access incision for the vascular pedicle, avoids expansion of the incision for a local flap technique, and does not prolong wound healing, and thus reduces both donor site and graft site morbidity of the RFFF. This technique leads to an inconspicuous aesthetic result with no apparent relevant functional deficits and avoids the need for a second donor site.

Key words: donor site morbidity; radial forearm free flap; harvesting defect; skin graft.

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Reconstructive procedures after ablative head and neck cancer surgery often require the replacement of tissue by transplantation of microvascular anastomosed free flaps in order to compensate functionally

and aesthetically for the defect. For soft tissue reconstruction of limited-size defects, the radial forearm free flap (RFFF) has become the most commonly used flap in the head and neck region. This

thin and versatile flap is also used widely for thin defects of the oral cavity, with good functional and cosmetic results.¹ The high calibre of the vessels and the long vascular pedicle considerably facilitate

anastomoses and make the RFFF a reliable flap with a high success rate.²

The harvesting of a defined amount of tissue for the reconstruction of remote defects inevitably leads to a removal defect at the donor site, which is potentially accompanied by corresponding morbidity. Prolonged wound healing, for example, is an undesirable inconvenience that may lead to poor aesthetic results, and flexor tendon exposure may lead to an appreciable loss of function.³ Since the introduction of the RFFF more than 30 years ago, different approaches have been made to reduce donor site morbidity.⁴ These range from changes in the design of the flap, for example the suprafascial dissection, to different closure techniques.⁵ Oversewing with the flexor muscles has been recommended to protect the flexor carpi radialis tendon, and the approximation of the flexor digitorum muscle to the flexor and abductor pollicis longus muscle has been described to provide a well-vascularized bed for a split-thickness skin graft.^{6,7} The split-thickness skin graft requires a further donor site and is prone to inconvenient prolonged wound healing. In order to avoid its use, different methods of primary closure have been reported: the V-Y transposition of an ulnar forearm fasciocutaneous flap, a transposition flap, the prefabrication of the forearm fascia, and the use of tissue expanders.⁸⁻¹²

For indirect defect closure, autogenous full-thickness skin grafts (FTSG) have been reported to achieve similar or better aesthetic results.¹³⁻¹⁵ These can be gained locally or harvested from remote regions such as the inner upper arm, abdominal wall, or groin.^{14,16-18}

For the sake of completeness, allogeneic grafts and vacuum-assisted closure (sub-atmospheric pressure dressing) should also be mentioned here, however these have taken a back seat in the face of the good results obtained and feasibility of the previously described procedures.^{19,20}

In head and neck microvascular reconstruction, a long pedicle and a thin flap are often needed, which commonly leads to the removal of the RFFF from the very distal forearm. The resulting donor site defect is close to the hand wrist, requiring special consideration with regard to wound closure due to the superficial flexor tendons and the restricted amount and moveability of the local tissue.

Materials and methods

This study was approved by the local ethics committee. All patients gave written informed consent after being provided

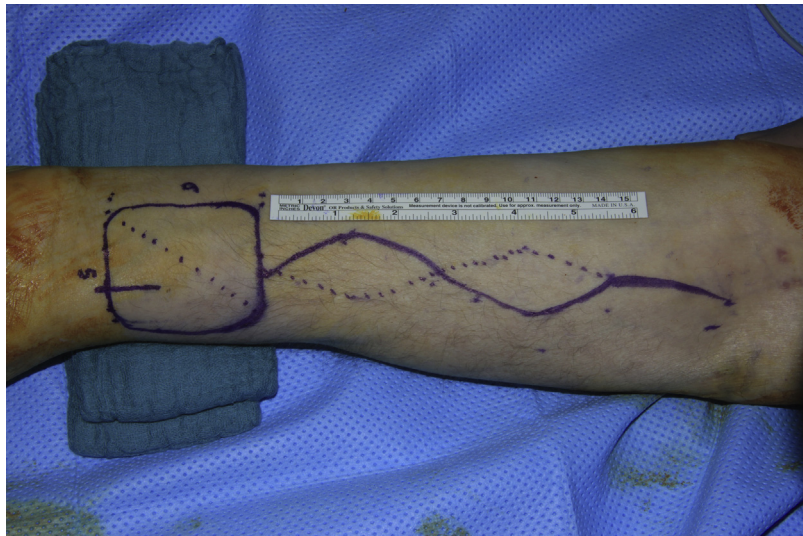


Fig. 1. Plotting of the planned incisions on the left forearm (hand wrist to the left, elbow to the right). The continuous lines represent the outline of the radial forearm free flap (6 cm × 5 cm), as well as the wavelike access incision to the pedicle. The dashed lines predict two biconvex full-thickness skin grafts and their oblique orientation for prospective wound coverage.

with detailed information of the procedure. Thirty consecutive adult patients undergoing RFFF reconstruction for orofacial defects were included in this prospective study. A detailed history was taken regarding general diseases, former operations or trauma, risk factors, diseases of haemostasis, and smoking and alcohol consumption. Evaluations were performed pre-, intra-, and postoperatively. The preoperative assessment included age, gender, donor arm (dominant or non-dominant), and an Allen's test. During the intraoperative assessment, the dimensions of the skin

paddle as well as any operative difficulties or complications were noted.

The duration of graft healing was defined as the time taken until a dry dressing was sufficient.

Patients

Thirty patients with 30 RFFF were included in this study (13 female and 17 male). Twenty-five RFFF were harvested from the left arm and five from the right arm. The mean age of the patients was 61.2 years, ranging from 20 to 90 years. All 30



Fig. 2. The completely raised radial forearm free flap (pedicle still perfused) is positioned on the bend of the elbow. The two spindle-shaped full-thickness skin grafts appear semi-lunar due to the loss of tissue interconnection and skin curling.

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