

Comparison of sensory recovery at the subfascial and suprafascial donor sites of the free radial flap

C.M.E. Avery^{a,*}, K. Sundaram^a, V. Jasani^a, A. Peden^b, C.P. Neal^c

^a Department of Maxillofacial Surgery, University Hospitals of Leicester NHS Trust, United Kingdom

^b Department of Mathematics, University of Leicester, United Kingdom

^c University Hospitals of Leicester NHS Trust, United Kingdom

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Abstract

The radial flap may be raised using a subfascial or suprafascial approach. The latter donor site is associated with fewer healing complications. We retrospectively evaluated the quality of sensory recovery within two comparable groups of 30 patients with subfascial and suprafascial donor sites. When considering the two groups, two-point discrimination was the modality most commonly reduced, with 97% of patients in both groups having reduced sensation in at least one anatomical zone. Sensation of sharp touch was most often lost; 90% in the subfascial and 83% in the suprafascial groups lost sensation in at least one anatomical zone. Roughly half the patients had reduced perception of light touch (43% and 50%), whilst perception of heat (27% and 17%) and cold (33% and 27%) were lost least often. At least one modality in at least one anatomical zone was lost or reduced in all patients, and roughly two-thirds (73% and 63%) had a reduction in 3 or more. The only significant difference between the donor and non-donor arms was reduced perception of sharp touch in the anterior forearm in both groups ($p < 0.001$). Perception at the two sites (including the anatomical snuff box) was similar except for superior thenar palmar light touch ($p = 0.015$) in the suprafascial group, which may indicate injury to the thenar cutaneous sensory branches during subfascial dissection.

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Introduction

Defects of the oral cavity are most commonly reconstructed using the fasciocutaneous radial flap.¹ Wound healing complications at the subfascial donor site have been widely reported and often include loss of the skin graft, exposure of tendons, and delayed healing,^{1–3} but the incidence and pattern of sensory changes have been studied less well. Sensory loss is variable and typically occurs at between a half to three-quarters of fasciocutaneous donor sites.⁴

The radial flap may also be raised as a septocutaneous flap by using the suprafascial dissection technique which retains the fascial covering over the flexor tendons. The incidence of wound complications at the suprafascial donor site was lower than at the subfascial site in several large operative series^{1,5–7} and in one relatively small comparative study.⁸

The superficial branch of the radial nerve lies just above the fascia (Fig. 1) and suprafascial dissection proceeds along the superior aspect of the nerve. The branch is readily identified and requires minimal mobilisation, but it is not known whether this results in improved sensory recovery. To our knowledge, sensory recovery at the suprafascial donor site has not previously been studied objectively, and this report is the first to compare the extent of sensory recovery at subfascial and suprafascial donor sites.

* Corresponding author at: Department of Maxillofacial Surgery, University Hospitals of Leicester NHS Trust, Leicester LE1 5WW, United Kingdom. Tel.: +44 0116 258 6953; fax: +44 0116 258 5205.

E-mail address: chrisavery@doctors.org.uk (C.M.E. Avery).

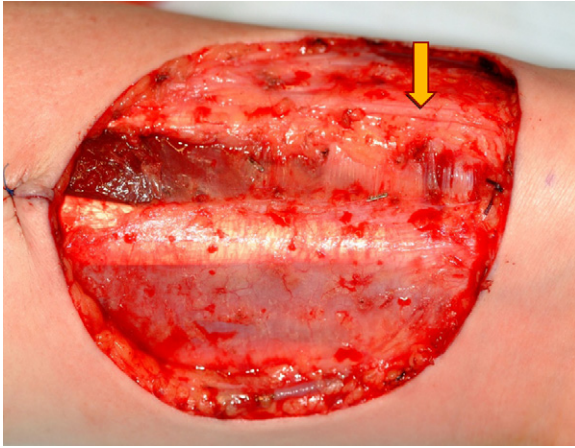


Fig. 1. Suprafascial radial donor site covered by investing fascia. In the suprafascial dissection the sensory branches of the superficial branch of the radial nerve (arrow) usually remain within the subcutaneous tissue and do not require formal mobilisation.

Method

Patients who had undergone harvest of a non-sensate radial free flap and who had been followed up for over one year were recruited at the time of clinical review. Ethical approval and appropriate informed consent were obtained. Data collected included demographic details, type of radial flap, size and type of skin graft; and wound complications such as loss of graft, exposure of tendons, and healing delayed beyond 30 days. Full thickness grafts were primarily harvested from the inner upper arm,⁹ and partial thickness grafts were harvested from the proximal ipsilateral forearm or outer upper arm.

Assessment of sensory recovery

The forearm and hand were subdivided into anatomical zones based on the Touch-Test (North Coast Medical, Inc. CA, USA) sensory evaluator mapping system. Sensation of the skin graft at the donor site was also assessed. Patients closed their eyes during testing. The stimulus was applied up to three times and a single response was positive; the most sensitive value was recorded. To minimise false responses a test stimulus was not always done.

Light touch

Light touch was tested using Semmes-Weinstein monofilaments. A single response was positive for monofilament sizes 1.65–4.08 (0.008–1.0 gf). A single stimulus was applied for sizes 4.17–6.65 (1.4–300 gf). The force levels were correlated to clinical sensory thresholds (Table 1).

Table 1

Sensory evaluation score and clinical threshold.

Score	Target force (g)	Clinical sensory threshold
1	0.008–0.07	Normal
2	0.16–0.4	Diminished light touch
3	0.6–2	Diminished protective sensation
4	4–180	Loss of protective sensation
5	300	Deep pressure sensation only
6	–	Tested with no response

Sharp touch

Sharp sensation was assessed using a blunted 27-gauge dental needle without breaching the skin if possible.

Temperature

Dental mirrors were equilibrated in water at 0–5 °C (cold) or 50–55 °C (warm) and applied for 10 s.

Static two-point discrimination

A Touch-Test discriminator (North Coast Medical, Inc. CA, USA) was used.

Statistical analysis

Baseline variables in population were compared between groups using the chi-square test, Fisher's exact, or Mann Whitney *U* tests as appropriate. For sensory variables, clinical inferiority was deemed present when the donor arm was at least one grade lower than the non-donor arm – for example, the difference between normal touch and diminished light touch. Comparisons between groups for retained and reduced sensation were done using the chi-square or Fisher's exact test, as appropriate.

Results

There were 30 patients in the subfascial and suprafascial donor site groups. Overall median age of patients at the time of operation was 60 years (range 35–79), and the median postoperative follow-up period was 60 months (range 17–91 Table 2). The two groups were comparable in relation to age, sex, and length of follow-up (Table 2), and the number of flaps taken from the non-dominant arm was similar in both groups (subfascial *n* = 27 and suprafascial *n* = 29).

Rates of reduced perception in different sensory tests in the subfascial and suprafascial groups are summarised in Table 3. The incidence of reduced perception of light touch at individual sites in the donor arm relative to the non-donor arm varied from 10% to 43% in the subfascial group and from 20% to 37% in the suprafascial group. Sensitivity was reduced mainly to the level of diminished light touch. There were no significant differences in the incidence of reduced sensation in individual sensory areas of the donor arm between groups,

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