British Journal of Plastic Surgery (2005) **58**, 1131–1135

BJPS
An International Journal of Surgical Reconstruction
www.bjps.com

Donor site morbidity in cross-finger flaps☆

H. Koch*, A. Kielnhofer, M. Hubmer, E. Scharnagl

Division of Plastic Surgery, Department of Surgery, Medical University of Graz, Auenbruggerplatz 29, A-8036 Graz, Austria

Received 30 September 2004; accepted 28 April 2005

KEYWORDS
Cross-finger flap;
Donor site morbidity;
Total range of motion;
Pinch grip

Summary As relevant literature is scarce, this study was undertaken to assess the donor site morbidity of cross-finger flaps. It included 23 patients who had undergone reconstruction of a finger defect with a cross-finger flap. Any additional trauma to the donor finger was an exclusion criterion. Split thickness skin grafts were employed for donor site closure in 13 cases, full thickness skin grafts were used in 10 cases. Follow-up time averaged 83 months. Active and passive total range of motion of the donor finger and maximal pinch grip strength in kilopascals were measured. Both parameters were compared to the corresponding finger of the other hand. The donor site scar was evaluated for instability and pain in the donor finger was determined subjectively with a visual analogue scale. Cold intolerance and the cosmetic appearance of the donor site were also assessed.

Active total range of motion of the donor fingers averaged 156°. Average active total range of motion of the contralateral control fingers was 173.6°. There was a significant difference between the donor fingers and the control fingers ($p=0.03$) but not between split thickness and full thickness grafted donor sites ($p=0.91$). Grip strength was significantly impaired in the donor fingers ($p=0.03$), but there was no significant difference between split thickness and full thickness grafted donor sites. Subjective cosmetic evaluation by the patients revealed significantly better results for full thickness grafted donor sites. Donor finger pain averaged 2.4 with a range of 0–8. Five of the 13 patients with split thickness grafted donor sites and two of the 10 patients with full thickness grafted donor sites mentioned cold intolerance.

In conclusion, the cross-finger flap is a secure and valuable option. There is, however, significant donor site morbidity. Our results suggest that alternative solutions should also be considered and if a cross-finger flap is employed, donor sites should be closed with full thickness grafts.

☆The work was presented at the 34th Meeting of the Vereinigung der Deutschen Plastischen Chirurgen, October 1–4, 2003, Freiburg (Poster) and the 42nd Meeting of the Austrian Society for Plastic, Aesthetic and Reconstructive Surgery, October 7–9, 2004, Innsbruck.

* Corresponding author. Tel.: +43 316 385 4685; fax: +43 316 385 4690.
E-mail address: horst.koch@meduni-graz.at (H. Koch).

S0007-1226/$ - see front matter
doi:10.1016/j.bjps.2005.04.047

Since its introduction in the literature,[1] the cross-finger flap has gained wide acceptance in reconstructive hand surgery, due to its ease of dissection, its anatomical security and the provision of soft and pliable tissue very well suited for reconstruction of finger defects. Besides these advantages, this flap also has its disadvantages. There is the apparent drawback of being a two-stage procedure. As donor site morbidity is not often addressed with the cross-finger flap, this study was undertaken to evaluate the donor site morbidity of this commonly used procedure.

Materials and methods

Between 1985 and 2001, 48 patients underwent defect closure on a long finger using a cross-finger flap. Patients who had sustained any kind of additional trauma to the donor finger were excluded from the study. Of the remaining patients, 23 could be examined within the scope of this study. There were 21 males and two females with an average age of 30.28 years (1.5–59 years, median 30 years) at the time of surgery. Thirteen defects were localised on the left and 10 on the right hand. In seven cases the index finger, in 10 the middle finger, in four cases the ring finger, and in two cases the little finger were injured. The defects resulted from different kinds of trauma ($n=17$), thermal injuries ($n=5$) and infection ($n=1$). The flaps were harvested from the second finger ($n=5$), from the third finger ($n=7$), from the fourth finger ($n=7$), and from the little finger ($n=4$). Split thickness skin grafts were employed for donor site closure in 13 cases, full thickness skin grafts were used in 10 cases. Follow-up averaged 83 months (24–215 months).

At the time of examination, donor finger pain was given subjectively by the patient using a visual analogue scale with 10 grades (0=no pain, 10=maximal imaginable pain). In addition, patients were requested to subjectively assess the cosmetic appearance of the donor site. Again, a visual analogue scale with 10 grades was employed (0=no cosmetic impairment, 10=maximal cosmetic impairment). A Mann–Whitney test was used to evaluate differences between the group of patients with split-thickness-skin-grafted donor sites (SG) and the group with full-thickness-skin-grafted donor sites (FG) concerning pain and cosmetic appearance. The patients were queried as to cold intolerance and a raw evaluation of touch sensitivity of the donor site was done; further, the donor site was evaluated for signs of instability. Differences between the two groups regarding cold intolerance, sensibility and instability were evaluated statistically with Fisher's exact test. Physical examination included evaluation of active and passive total range of motion (TRM) of the donor finger with a standard hand goniometer, and of maximal pinch grip strength. This was measured in kilopascals (kPa) using a Martin vigorimeter (Gebrüder Martin, Germany). One individual had to be excluded from strength testing due to a preceding thumb amputation on the contralateral side. Both range of motion and maximal grip strength were compared to the uninjured corresponding finger of the opposite hand; a repeated measures ANOVA was used for statistical evaluation. A regression analysis was done to evaluate the influence of the patient's age at the time of operation on range of motion and maximal grip strength of the donor finger.

Results

The results are summarised in Table 1. The overall mean value for pain on the visual analogue scale was 2.4 (median 1, range 0–8). There was no statistically significant difference between the two groups ($p=0.47$). Regarding the subjective cosmetic estimation of the donor sites, however, there was a significant difference between the two groups. The overall mean value for cosmetic impairment was 3 (median 2, range 0–10). In the SG the mean was 4.15 with a median of 4 and a range from 0 to 10. In the FG it was mean 1.6 with a median of 1 and a range from 0 to 4 ($p=0.04$).

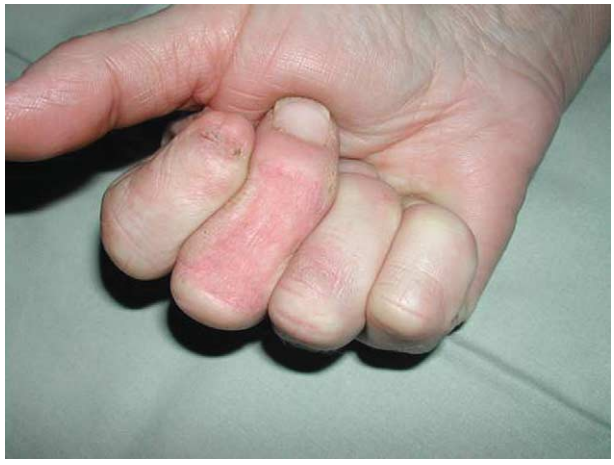

Figure 1 Forty-year-old man with cross-finger flap donor site on the middle finger with flexion deficit and contour defect.