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Donor finger morbidity in cross-finger flaps

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Abstract

We reviewed 16 patients who had cross-finger flap procedures carried out between 1991 and 1996 at the West Midlands Regional centre for Plastic and Reconstructive Surgery. We looked specifically at the donor finger morbidity of each patient with a median follow up interval of 43 months.

At follow up there were 10 patients with cold intolerance, eight patients with subjective joint stiffness and a documented reduced range of finger joint movement. Skin graft reconstruction of the secondary defect was associated with poor colour match in eight cases (seven hyperpigmented, one hypopigmented) and visible contour deformity in eight cases. There were no clinically significant differences between split skin graft or full thickness skin graft for donor finger reconstruction.

Although cross-finger flaps may provide soft tissue cover in a variety of finger pulp injuries, these results show an alarming incidence of donor finger morbidity associated with such procedures.

1. Introduction

Cross-finger flaps may be used in fingertip injuries to reconstruct soft tissue losses resulting in exposed tendon or bone. These flaps are relatively straightforward to perform and novice hand surgeons may be tempted to use them. However, cross-finger flaps are associated with donor finger stiffness, particularly in those patients over 50 [1]. As an alternative more technically demanding homodigital flaps have been recommended [2,3]. Despite 'common knowledge' of donor finger morbidity after cross-finger flaps only anecdotal evidence exists in the literature to support this. In an attempt to qualify and quantify donor finger morbidity we reviewed patients who had undergone cross-finger flaps in our unit in the preceding 5 years.

2. Patients and methods

Sixteen patients between 1991 and 1996 had their finger pulp injuries reconstructed with a cross-finger flap. All these injuries involved the loss of volar soft tissue down to but not including bone. All the flaps were performed as an emergency procedure by middle grade surgeons out of normal working hours. The cross-finger flaps were raised leaving the paratenon intact and sutured to the recipient site. No form of splintage was employed postoperatively. After division and inset of the flap between 12 and 17 days, patients were shown a range of passive and active motion exercises. Mean hand clinic follow up was 8 months. Patients were sent a questionnaire that focussed on the problems associated with their donor finger and were invited to a follow up clinic for an objective assessment.

Sixteen patients (17 cross-finger flaps), were reviewed and examined. Fourteen patients were male age ranged from 6 to 59 years (median = 41 years). Fifteen patients were right handed; 10 had injured their dominant hand; nine male patients were manual workers and all sustained their injuries at work. Of the remaining five males three were students and two were unemployed. One female patient was a housewife who sustained a slicing injury on a knife; the other was involved in a

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road traffic accident and required two cross-finger flaps.

Patients were asked to score their donor finger for (a) stiffness, (b) pain and (c) cold sensitivity each being graded as excellent, good or poor. The same assessor recorded: (i) colour matching (normal, hypo-, hyperpigmented); (ii) degree of contour deformity (none, depressed, raised) and (iii) measured active and passive range of movement at the metacarpophalangeal joint (MCPJ), proximal interphalangeal joint (PIPJ) and distal interphalangeal joint (DIPJ) using a standard goniometer measured to the nearest 5°. These measurements were also made in the same finger on the other side to act as a control. From these measurements the Strickland index [4] was calculated and the outcome for each donor finger classified as excellent, good, fair or poor. Full thickness grafts were compared to split thickness grafts with respect to donor finger stiffness, colour match and contour deformity. These results were analysed using chi-squared analysis with Yates' correction, Fishers exact test and the Mann–Whitney *U*-test.

3. Results

Sixteen patients with 17 cross-finger flaps were reviewed. The time from injury to assessment ranged from nine months to 64 months (median = 43.5). The donor finger was the middle in 10 cases, the ring in three and the index in four. The flap was raised at the level of the middle phalanx in 10 cases and proximal phalanx in seven. The donor finger defect was reconstructed with a full thickness skin graft (FTSG) in 11 cases (seven from the groin, three antecubital fossa and one forearm). Five of these skin grafts were associated with donor finger stiffness, seven were poorly matched for colour (six hyperpigmented; one hypopigmented) and five had a visible contour deformity.

Split thickness skin graft (SSG) reconstruction of the donor finger was carried out in six cases (three from the forearm, two from the thigh and one from the hypothenar eminence). Four of these were associated with stiffness, one was poorly matched for colour (hypopigmented) and three had a visible contour deformity.

Although clinically there was a greater tendency for the FTSG to become hyperpigmented Figs. 1 and 2,

Fig. 1. A FTSG used to cover the donor finger defect of a 51-year-old Asian lady showing hyperpigmentation and a visible contour deformity.

Fig. 2. Another FTSG in a Caucasian male showing pigmentary change.

statistically, there were no significant differences between the use of FTSG and SSG in covering the donor defect.

Eight patients had subjective joint stiffness and a documented reduced range of finger joint movement within the donor finger Table 1. The remaining eight patients scored a Strickland index of 100.

Stiffness occurred in seven out of nine patients whose age was greater than the median (41 years) range 43–59 years and in one out of seven whose age was less than the median, range 6–41 years. Because of the small number of patients in our group it was not possible to assume normality of the data and a Mann–Whitney *U*-test gave a *p*-value of 0.058 which was not significant at the 95% level for age related finger stiffness. Ten patients suffered cold intolerance in the donor finger; although not specifically assessed cold intolerance was common in the injured digit too.

Three patients were troubled with eczematous changes at the junction of the graft and it's inset.

None of the patients complained of pain within the donor finger.

4. Discussion

Cross-finger flaps are a relatively straightforward method of finger and finger tip soft tissue reconstruction. These flaps can provide cover for exposed bone and tendon with a reliable, durable pad of soft tissue [1,5,6] However, others have increasingly condemned these flaps for reconstructing finger tip injuries citing morbidity associated with them.

Ma et al. [7] carried out a prospective randomised study of seven methods of treating simple finger tip injuries in a group of 200 patients. They compared split skin grafts, local advancement flaps, amputation, simple dressings and cross-finger flaps. They concluded that cross-finger flaps provided little advantage over other methods of reconstruction and were associated with more healing problems, a greater degree of weakness and a greater loss of total active movement in the injured finger. From a cosmetic view the local advancement flaps scored better than the cross-finger flaps which scored the same as a simple split skin graft.

Table 1
Age related donor finger stiffness a Strickland index of 100 is normal

Age	Strickland index
51	71
46	83
37	75
59	84
45	93
43	82; 65
46	70
49	64

To our knowledge our study is the first to specifically address the problem of donor finger morbidity following a cross-finger flap procedure. Half of our patients suffered long-term finger joint stiffness; half had either a hyperpigmented or a hypopigmented donor site and half had a visible contour deformity. Because of our small study group we found no statistically significant difference between the use of split thickness and full thickness skin grafts in providing donor finger cover. However, the data and our clinical experience leads us to believe that the simpler split skin graft compares favourably to the more time consuming full thickness graft.

Of the eight donor fingers that were poorly matched for colour, seven became hyperpigmented — six of those were covered with a FTSG (five harvested from the groin) only one SSG showed a similar colour change out of a total of six grafts. This finding contradicts earlier work which states that SSG's are more likely to become pigmented than FTSG's (Ponten, B 1960). Anecdotally the groin donor site is said to produce grafts which become more readily pigmented when compared to those taken from around the head and neck region. There are no studies available to confirm or deny this, however in the light of our results we suggest that if FTSG are used it may be more appropriate to avoid the groin donor site in those areas exposed to the sun.

Kleinert, suggested avoiding cross-finger flaps in patients over the age of 50 because of stiffness in the reconstructed finger [1]. Our study concentrated on donor finger stiffness which we found to be clinically problematic in patients over the age of 41 years. With the small number of patients in our study group normality of the data could not be assured and a Mann–Whitney *U*-test gave us a *p*-value of 0.058 for age -related donor finger stiffness. More patients would need to be recruited before statistical significance could be achieved.

We have seen an alarming incidence of donor finger morbidity. Half of our patients suffered joint stiffness; reduced range of movement; colour mismatch and contour deformity. We can confirm the anecdotal reports of donor finger morbidity. We have shown that these are in fact a common occurrence, and at times produce a donor finger which is both stiff and cosmetically displeasing.

This morbidity is acceptable if other methods of reconstruction are not practical. However the unselected use of cross-finger flaps for finger reconstruction is no longer acceptable. If flap reconstruction is needed for a finger injury we support the view that, in order

to confine the injury to one finger, homodigital flaps should be used where possible.

If cross-finger flaps are used then donor morbidity should be discussed with the patient; split-thickness skin grafts are preferable to full thickness and aggressive therapy and splintage of the donor finger are essential.

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