Quilting of full thickness grafts in the hand

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KEYWORDS
Full thickness skin graft; Tie-over; Quilting

Summary A skin graft is the simplest way to reconstruct an area of skin loss. To improve the chance of successful take, shearing forces and haematoma formation between the bed and the graft must be reduced. To achieve this, many surgeons use a tie-over dressing to secure the graft. However, ‘quilting’ the graft to the wound bed is an alternative method for securing grafts which may be superior to tie-over dressings.

The purpose of this study was to compare the outcome of securing a full thickness graft by tie-over dressing versus quilting in the hand. To do this, we performed a retrospective review of graft-take in a consecutive series of 40 patients undergoing dermofasciectomy for Dupuytren’s disease over a five year period.

Our results demonstrate no significant difference in graft-take comparing grafts secured with a tie-over dressing or by quilting. Importantly, there were no cases of injury to the tendons or neurovascular structures in those cases where the graft was secured by quilting.

Our technique for securing the graft by quilting is less time-consuming compared with a tie-over dressing. Therefore, we no longer use tie-over dressings to secure full-thickness grafts in the hand.

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A skin graft is the simplest way of reconstructing an area of skin loss. A piece of skin (of variable size and thickness) is completely detached from a donor site and transferred to cover another area to be repaired (recipient site). The skin graft must then acquire a blood supply from the wound bed and ‘take’ at the recipient site. To improve the chance of successful take, shearing forces and haematoma formation between the bed and the graft must be reduced. To achieve these aims, many surgeons use a tie-over dressing to secure the graft. However, ‘quilting’ the graft to the wound bed is an alternative method for securing grafts which may be superior to tie-over dressings.

There is now a reasonable body of evidence to suggest that quilting is as effective as tie-over dressings at improving graft-take in sites such as the head and neck. Although its successful use has been shown in the dorsum of the hand this has never been shown in the volar aspect of the hand - probably due to concerns over injury to the tendons and/or neurovascular structures. The purpose of this study was to compare the outcome of securing a full thickness graft by tie-over dressing versus quilting in the hand.
We performed a retrospective review of graft-take in a consecutive series of patients undergoing dermofasciectomy for Dupuytren’s disease under the care of a single surgeon (the senior author) over a 5-year period (2001–2006). In 2003, the senior author was motivated to change his practice because of his own (anecdotal) observation that graft-take is improved for grafts secured by quilting on the face and trunk and because quilting (in his hands) is less time-consuming than securing a graft with a tie-over dressing.

**Method**

A total of 40 consecutive cases were examined for this study. In the first 20 cases, the full-thickness grafts were secured to the digits with a tie-over dressing. In the second 20 cases, the grafts were secured to the digits by quilting. There were 13 women and 27 men in the study. Their ages ranged from 58–91 years. Severity of the flexion deformity ranged from 25–135 degrees (Tubiana classification).

The quilting technique is(6,6),(995,994) simple. All grafts are placed over the proximal segment of the fingers or thumb (Figure 1). The edges of the graft are secured with a continuous 5/0 vicryl rapide suture. Two or three quilting sutures of 5/0 vicryl rapide are then inserted along the midline of the graft into the flexor sheath (Figure 2). Great care is taken to ensure that there is full tendon excursion after all the sutures are inserted. No other sutures are inserted to secure the grafts. The fingers are dressed in the normal fashion with jelonet and gauze and the hand is placed in a static splint with the fingers in full extension for 1 week.

Securing the grafts by tie-over dressing has been described previously. We use 5/0 vicryl rapide sutures placed at regular intervals around the edge of the graft. One end of each suture is left long. A piece of jelonet is cut to fit the graft and then a roll of pro-flavine soaked wool is placed over this. The wool is secured over the graft by tying the long ends of the sutures over the wool (Figure 3). The fingers are then placed in a static splint with the fingers in full extension for 1 week.

Graft-take was assessed in clinic at 1 week. Any healing complications were recorded in the clinical notes and this information was collected on a proforma used for later analysis. Patients were seen again at 2–4 weeks and again at 2–3 months post-op.

**Results**

Amongst the 40 patients, there was only one complete and one partial graft failure — both due to haematoma. Both of
these occurred in the group of grafts secured with a tie-over dressing. The grafts secured by quilting had 100% graft take. This difference failed to reach statistical significance (Table 1). There were no other recorded complications or adverse outcomes directly related to the technique for securing the grafts in either group. Specifically, there was no evidence for injury to the neurovascular bundles or the tendons.

**Discussion**

Conventional teaching dictates that the application of even pressure to a skin graft is one of the most important requirements for ensuring successful graft take.\(^3\)\(^-\)\(^5\) It is meant to ensure that the graft is pushed down onto the wound bed so that contact between the graft and the bed is maximised. It is also meant to reduce the formation of fluid collections (either seroma or haematoma) which may interfere with graft take.\(^3\)\(^,\)\(^5\)\(^,\)\(^6\) Complete immobilisation of the body part through the use of appropriate splints is another essential requirement for successful graft take.\(^3\)

For many years, the goal of achieving even pressure over small skin grafts has been achieved through the use of a tie-over dressing. Intuitively, this must work because it physically forces the graft onto the wound bed and thereby squeezes any fluid which may collect under the graft to the edges. However, the ability of a tie-over dressing to achieve this simple aim has been called into question. Recent studies have shown that tie-over dressings do not exert significant pressure over the graft.\(^7\) The principles of tissue expansion (i.e. stress relaxation and mechanical/biological creep) ensure that within a few minutes/hours of applying a tie-over dressing, the pressure under the dressing will become insignificant. Indirect evidence for the tissue expansion effect is easily demonstrated when the tie-over dressing is removed. The normal skin into which the sutures are anchored is often raised which can give the defect an alarming 'cratered' appearance which rapidly flattens (Figure 4).

A tie-over dressing has other disadvantages. Bolster-type dressings are less able to contour a graft to the curved and irregular surfaces found in the hand. The graft may even become misaligned - specifically because of the bolster. The surgeon will be unaware of this because the bolster obscures the graft. Tie-over dressings may also appear aesthetically displeasing, especially toward the end of their utilisation period because cleaning is difficult.\(^2\) This does not happen with a graft secured with quilting sutures because the graft remains visible at all times.\(^2\)

Quilting is a well documented alternative to a tie-over dressing for securing a graft (both full-thickness and

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**Table 1** Data analysis.

<table>
<thead>
<tr>
<th>Data analysed</th>
<th>100% Take</th>
<th>Failed Graft</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quilted Grafts</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Tie-over</td>
<td>18</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>2</td>
<td>40</td>
</tr>
</tbody>
</table>

Chi-square

| Chi-square,df | 2.105,1 |
| P value       | 0.1468  |
| P value summary| ns     |
However, most of these studies have examined the success of quilted grafts in the context of the face and trunk. There have been no studies examining the use of quilting to secure grafts in the hand. This is probably due to concerns about possible injury to deeper structures — especially neurovascular and tendon. However, the advantages of securing a graft by quilting are so compelling that the senior author was motivated to examine the use of the technique in the hand. Moreover, it has been our experience that securing a full thickness graft with a tie-over dressing is more ‘fiddly’ and time-consuming in the hand than securing a graft by quilting.

In our study, all the quilted grafts took successfully with no complications directly attributable to the technique for securing the graft (either tie-over or quilting). Grafts secured with a traditional tie-over dressing were slightly less successful with 2 failures but this difference did not achieve statistical significance.

On the basis of this study, we no longer use tie-over dressings to secure full-thickness grafts when performing a dermofasciectomy. We also use quilting to secure grafts in all other situations in the hand (e.g. syndactyly release, burn scar release). With careful placement of the quilting sutures, injury to deeper structures is unlikely. Moreover, the use of rapidly absorbing sutures (i.e. vicryl rapide) means that any accidental tethering of moving structures such as tendons will be broken the first time the patient mobilises their digits, one week after surgery.

**Disclosure**

I can confirm that no financial conflict of interest exists with any commercial entity whose products are described, reviewed, evaluated or compared in the manuscript.

**References**