

Short report

The template technique for breast mound planning when using abdominal flaps for breast reconstruction[☆]

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ABSTRACT

Delayed breast reconstruction with abdominal flaps typically involves a process of 'trial and error' when moulding the flap into a satisfactory breast mound. This moulding process is crucial to the final aesthetic result. We present a template technique to preoperatively plan the skin envelope of each reconstruction. Templates are quick and simple to construct, and are tailor-made based on several measurements from the contralateral breast. The technique is versatile and can be adjusted for use with Wise-pattern breast reduction or mastopexy. In our experience, the template technique reliably attains natural shape and good symmetry when compared with unplanned flap moulding.

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Introduction

DIEP and TRAM flaps are popular methods of breast reconstruction following mastectomy as they produce superior aesthetic results when compared with techniques utilizing implants.^{1,2} Moulding of the flap usually occurs after the flap has been transferred to the chest wall, and involves a process of 'trial and error' that can be time-consuming and potentially compromise the aesthetic result.

We present a simple technique for preoperative, bespoke templating that allows sculpting of the flap into a definitive breast mound prior to transfer to the chest wall. We have found it reliable in creating a natural-looking, symmetrical breast.

Surgical technique

Define landmarks (Fig. 1i)

- Mark the midline (a) and the vertical axis of the normal breast (b) (breast meridian).

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- Project the mastectomy scar onto the normal breast as viewed in the anterior-posterior direction (c). Do not transpose the true mastectomy scar length.
- On the meridian, mark the point of maximal projection (MP) (d), infra-mammary fold (IMF) (e) and infill (area above the projected scar containing breast tissue) (f).
- Using these markings, mark the proposed meridian, infill and IMF on the side to be reconstructed (g).

Measure (Fig. 1ii)

- Three vertical measurements (red) on the meridian:
 - Infill to Scar (a).
 - Scar to MP (b).
 - MP to IMF (c).
- Four horizontal measurements (blue):
 - Projected scar length, divided into medial (d) and lateral (e) components by the meridian.
 - IMF length, divided into medial (f) and lateral (g) components by the meridian.

Create the template (Fig. 1iii and iv)

Draw the template on a sheet of paper:

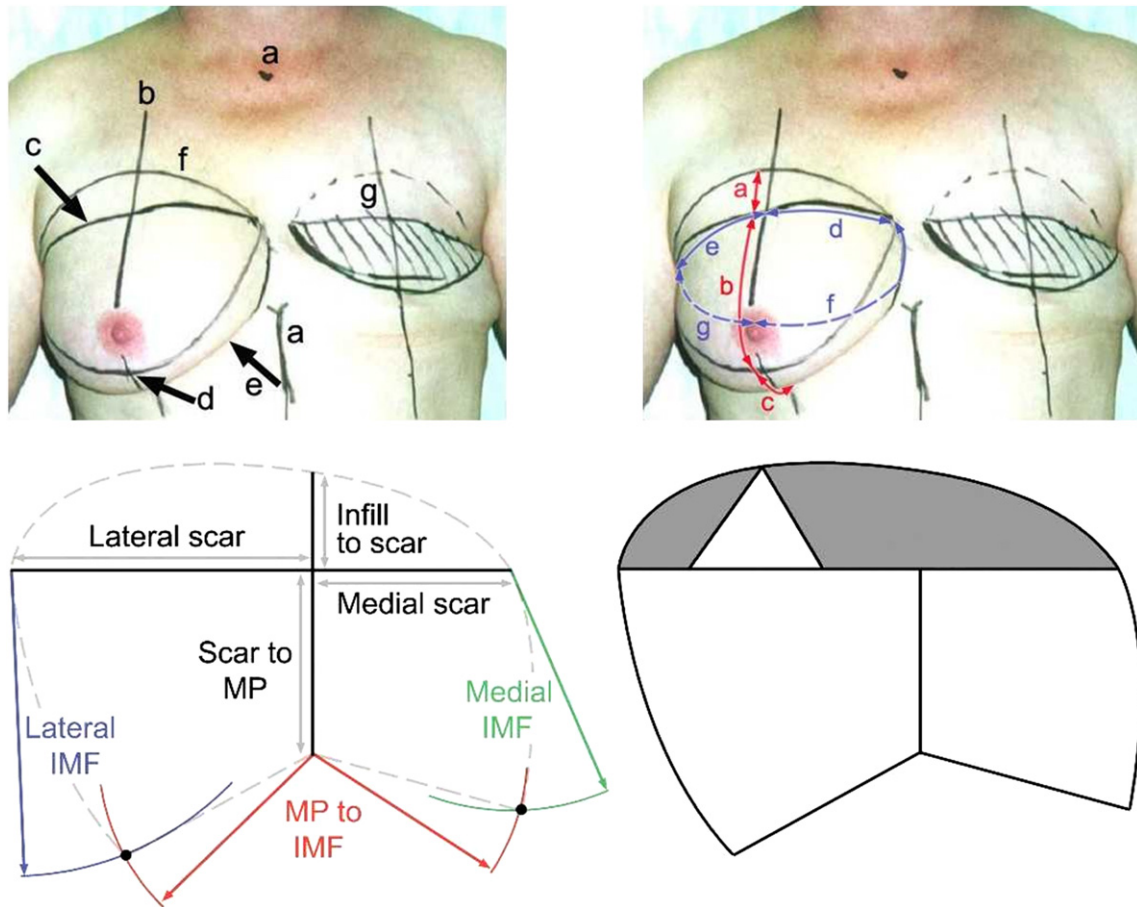


Fig. 1. Designing the template. (i). Define landmarks. a) midline; b) breast meridian; c) projected scar; d) point of maximum projection; e) infra-mammary fold; f) infill; g) mastectomy scar, projected infill and new infra-mammary fold. (ii). Measure. Vertical measurements in red, horizontal measurements in blue. a) scar to infill; b) scar to MP; c) MP to IMF; d) medial projected scar length; e) lateral projected scar length; f) medial IMF; g) lateral IMF. (iii). Create the template. Please refer to the accompanying text. (iv). The completed template. The grey area represents that portion of the flap to be de-epithelialized. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

- Draw a cross (Fig. 1iii, black lines) with the horizontal limb equal in length to the scar, and the vertical limb intersecting the horizontal at the junction of the medial and lateral scar components. The vertical limb comprises the infill to scar length *above*, and the scar to MP length *below* the intersection point.
- Using the end of the medial scar length as a pivot point, draw an arc with a radius equal to the medial IMF length (Fig. 1iii, green). Similarly, draw a second arc from a pivot point on the end of the lateral scar with a radius equal to the lateral IMF length (Fig. 1iii, blue).
- Using the inferior end of the scar to MP line as a pivot point, draw a third arc with a radius equal to the MP to IMF length (Fig. 1iii, red). The points at which this third arc intersects the 1st and 2nd arcs are marked (black dots).
- The outline of the template is completed by joining up the intersection points (black dots) with the ends of the cross (Fig. 1iii, grey dashed).
- Note that the lines between the intersection points and the ends of the lateral and medial scar lengths are gently curved and that the superior border of the template is formed by a curved line which is accentuated laterally. This is to take account of the axillary tale of the breast.
- The template is completed by marking an inverted-V on the lateral scar line with the apex meeting the superior border of the template (Fig. 1iv).

- Cut out the template and reverse it; fold into a cone and place it on the site to be reconstructed. Compare the cone with the normal breast for an approximate comparison of volume.

Transfer template (Fig 2)

- Taking into account the type of abdominal flap, the location of the perforators (for DIEP flaps) and the surgeon's choice of recipient vessels, a suitable site and template orientation are selected.
- **Place the template face-down on the abdomen.** This ensures a mirror image of the contralateral breast (Fig. 2i).
- Mark the borders of the template and trace the de-epithelialised area.
- Deepithelialize the marked area of skin (Fig. 2ii).
- Raise the flap using standard techniques.

Form breast mound (Fig. 2ii and iii)

- Form the breast mound by approximating the two superior edges of the flap with deep dermal and subcuticular sutures.

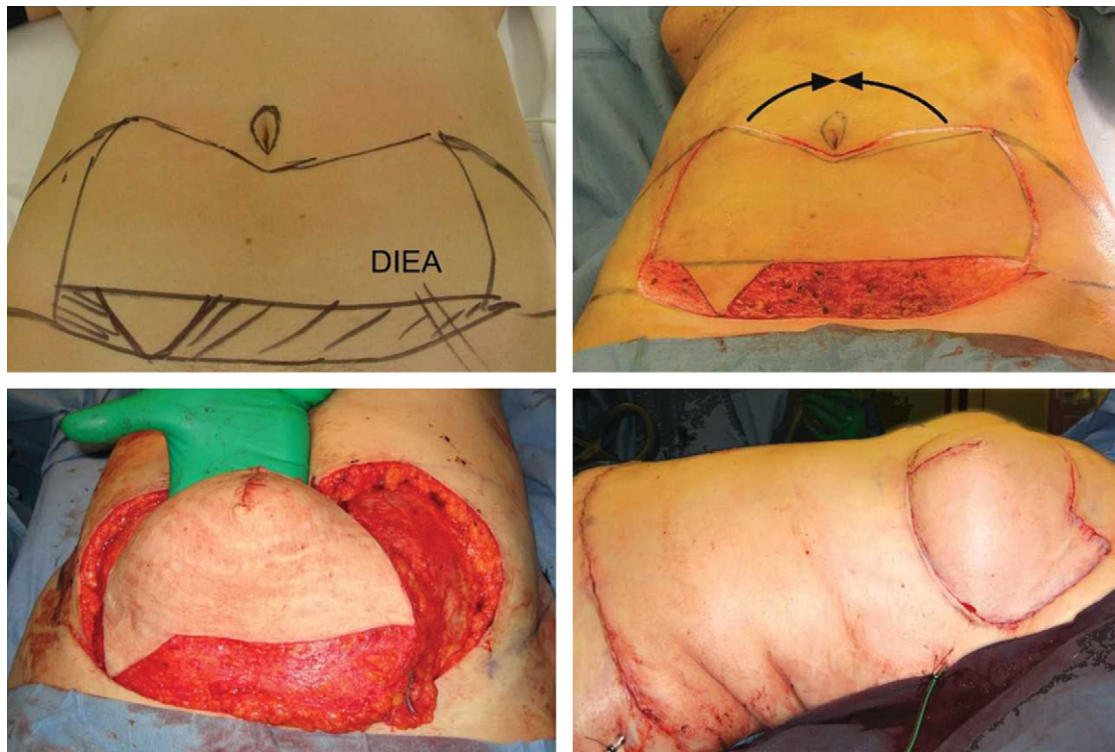


Fig. 2. Creating the breast mound (i). The breast template marked out on the abdominal wall. The template must always be placed face-down before tracing it on to the abdomen. We choose to orientate the template with the curved upper edge located inferiorly to facilitate donor site closure. In this example the deep inferior epigastric vascular pedicle enters the left-hand side of the flap (medial aspect of breast mound) to allow easier anastomoses with the internal mammary vessels. (ii). The deepithelialized flap. Arrows indicating the flap edges to be approximated to create the breast mound. (iii). The breast mound prior to transfer to the chest wall. (iv). The flap inset.

Transfer flap (Fig. 2iv)

- Excise the skin between the mastectomy scar and the proposed new infra-mammary fold.
- Elevate skin flaps superiorly and inferiorly to allow inset of the flap.
- Transfer the flap to the chest wall and perform the microvascular anastomoses.
- Incise the upper skin flap over the inverted-V of the flap to accommodate it.
- Suture the breast mound into place (2iv).

Creating a template based on a wise-pattern breast reduction/mastopexy

After marking a standard Wise-pattern on the breast, the projected scar, meridian, IMF and infill are marked. Substitute the 'scar

to MP' and 'MP to IMF' lengths with 'scar to apex of W' and 'short limb length of W' (where W is that of the Wise-pattern) respectively.

Discussion

In many centres, mastectomy followed by delayed reconstruction remains the algorithm of choice for selected patients suffering from breast cancer.^{3–6} Reconstruction with autologous tissue arguably offers the best breast in terms of shape, volume and symmetry.⁷

The breast skin envelope is one of the key determinants of its overall shape and this template technique allows you to create the skin envelope of the neo-breast. In our opinion, it reliably creates a breast mound that is a good match in terms of shape, volume and symmetry (Fig. 3). It can be adapted for use in contralateral breast reduction/mastopexy (as described above) or in bilateral reconstructions by creating a standard template based on the existing



Fig. 3. The result (i) and (ii). Demonstration of the good ptotic match of the neo-breast with the existing breast.

scars. A further advantage is a potential reduction in operating time.

The senior author (RJM) was introduced to an early form of the technique as a trainee^c and has subsequently made some modifications. The inverted-V-pattern on the superior aspect of the template releases tension and prevents the secondary scalloping that is frequently seen. Furthermore, the deepithelialized area allows the flap to be inset superiorly in a manner that realistically simulates the upper pole of the breast.

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^c The senior author was introduced to this technique at Canniesburn Hospital, Glasgow by Messrs A. Ray, J. Borman and I. Taggart.