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Harvesting free abdominal perforator flaps in the presence of previous upper abdominal scars

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Summary *Purpose:* Subcostal scars pose a risk of upper abdominal flap ischaemia when raising a free abdominal flap. The aim of this study was to describe a clinical approach to increase flap reliability and donor site healing in the presence of transverse abdominal scars while harvesting lower abdominal free flaps.
Methods: A total of 11 patients who had subcostal scars and one who had an extended subcostal scar (rooftop or chevron incision) underwent free abdominal flaps for breast reconstruction. Preoperative radiological imaging was used to evaluate the blood supply to the planned flaps. A classification of clinical approaches (I—IV) was used. When the cranial (the abdominal closure) flap width was equal to or greater than half length, a caudal (the breast) flap could safely be harvested (Type I); if not, the cranial flap was enlarged by more caudal flap planning (Type II), an oblique design of the free flap (Type III) or by lowering the free flap marking more distally (Type IV) with a sparing of the peri-umbilical perforators to preserve blood supply to the caudal (abdominal closure) flap.
Results: Unilateral free deep inferior epigastric perforator (DIEP) and superficial inferior epigastric artery (SIEA) flaps were successfully harvested in eight and two cases, respectively. In two cases, a bipedicled DIEP/SIEA flap was harvested for unilateral breast reconstruction. Slight abdominal wound slough occurred in one patient; however, no ischaemia resulted in flaps or at donor sites.

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Conclusions: Using a pragmatic approach to flap design, based on clinical classification, we have found that both flap and donor site morbidity can be avoided in patients who have previous upper abdominal scars.
Level of evidence: IV, Therapeutic.

The deep inferior epigastric perforator (DIEP) flap is the gold standard in microsurgical breast reconstruction and the first choice of the donor site at our institution. The large amount of available tissue enabling shaping of the reconstruction to natural-appearing breasts, the reliable vascular anatomy and an aesthetically pleasing donor site scar encourage its use. However, in some patients the DIEP flap is not considered the optimal choice, as previous abdominal surgeries with resulting scars may threaten the vascularity within the flap.[1–3] Previous cholecystectomy, for instance, may lead to skin and fat necrosis or wound breakdown at the donor site or in the flap area distal to the scar.[4,5] The problem of previous abdominal scars endangering the DIEP flap harvest is not addressed very often.[6] This may be due to the availability of several alternatives such as the transverse myocutaneous gracilis (TMG) flap, the free gluteal perforator flap or the myocutaneous latissimus dorsi flap that enable most surgeons to avoid risks for the flap or the donor site.

However, the abdomen may still be a donor site for flaps despite the presence of scars. Modifications to flap planning or using different strategies in harvesting the flap could offer a possible and safe donor site closure. When the lower abdominal pannus is redundant, the flap can be planned more caudally or obliquely to allow more width between the old upper scar and cranial incision of the harvested free flap. Sometimes, however, the lower abdominal tissue is limited because of a lack of skin-fat excess or the presence of a midline infraumbilical scar. Several reports have presented solutions to overcome this problem.[7–14] The purpose of this article was to present a combination of approaches to allow safe DIEP flap harvest in the presence of previous subcostal and/or upper abdominal scars.

Material & methods

A retrospective case note review was performed in a series of 866 patients who underwent breast reconstruction with free abdominal perforator (DIEP and superficial inferior epigastric artery (SIEA)) flaps by the senior author from 2001 to 2011. Among them, 12 (1.04%) patients underwent free abdominal flaps for breast reconstruction despite the presence of transverse scars in the upper abdomen. Of the patients, 11 had subcostal scars and one patient had an extended (full transverse) subcostal scar (rooftop or chevron incision). Preoperative imaging (colour Doppler or computed

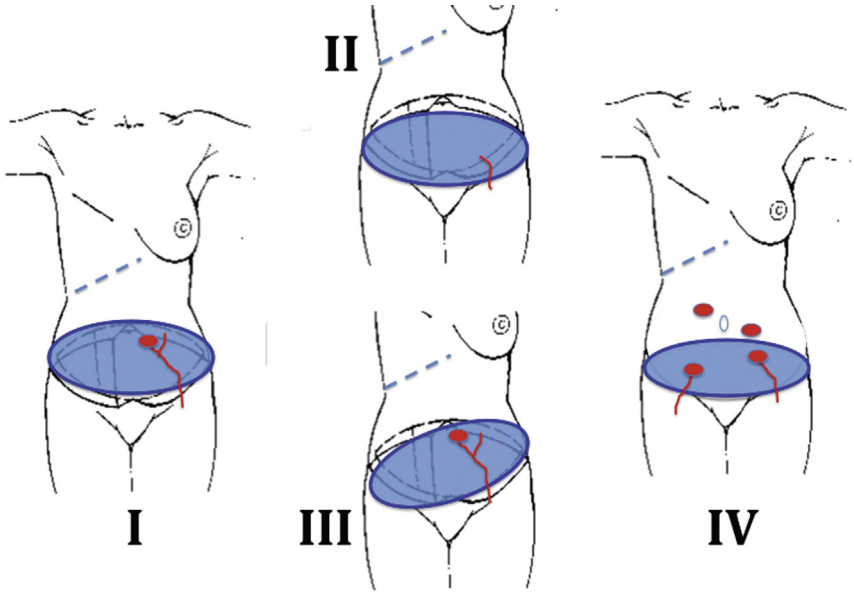

Figure 1 A Classification of our clinical approach of free lower abdominal flap harvesting with the presence of subcostal/upper abdominal scars. I: standard flap design (abdominal closure flap between subcostal scar and upper incision line has width $\geq$ halve' length) II: the flap is skewed away from subcostal scar and harvested based on SIE vessels or low located perforators. III: the flap is designed obliquely to increase abdominal closure flap width. IV: in case of Chevron scar: the flap is skewed more distally to keep peri-umbilical perforators to the abdominal closure flap. Flap can be harvested on a combination of bipedicled abdominal flaps to increase the amount of harvested tissue.