

Pre operative computed tomographic angiography (CTA): A valuable lesson in planning DIEP flaps

In 2007 Lasso et al¹ described, in this journal, 'epi-peritoneal' perforators emerging from under the posterior fascia of the rectus abdominis muscle. They used these perforators to supercharge their DIEP flaps. In our combined experience of over 600 DIEP flaps, we have observed an epi-peritoneal perforator only once. In this case the perforator attracted our attention pre-operatively during CTA analysis. The radiologists predicted that the perforator would arise from the peritoneal cavity, as it could not be followed accurately to the inferior epigastric artery and the angle which it entered the abdominal fat from the rectus fascia seemed to differ. Preparation of the perforator intra-operatively confirmed that it came from the intra-abdominal cavity.

As perforator flaps are increasingly being considered as the gold standard in breast reconstruction, any technique to improve the speed and above all safety of these procedures should be encouraged. Previous attempts at improving outcomes for DIEP flaps have largely focused on operative technique and post-operative course modification,² however preoperative planning is being increasingly recognised as an essential element of DIEP flap surgery. Adequate imaging can aid patient selection, plan the operative technique, reduce operating time and improve operative outcomes. The use of multi-slice CT angiography has recently been discovered as a powerful planning tool for DIEP flap surgery.^{3,4} Recent cadaveric studies have shown that the branching pattern on CT tomography is strongly correlated to the location and intramuscular course of perforators, from the main DIEA trunk to the point of the penetrating rectus sheath.⁵ As the speed, efficacy and above all safety of these procedures is increased, they will undoubtedly be performed in more and more centres across the world. We believe an accurate knowledge of the vascular anatomy is the key for a safe, efficient dissection. This is especially true in uncommon cases with variable anatomy such as epi-peritoneal perforators. Radiological pre-operative localisation on a CTA may save time, and hence morbidity related to operative time such as thrombo-embolism and pressure problems, as well as allowing more efficient use of operating resources.

Conflict of interest

We can confirm that none of the authors of this manuscript have any financial or other interest in any of the techniques described in this manuscript.

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Perforator territory of the keystone flap — use of the dermatomal roadmap

Dermal plotting of perforators with a Doppler ultrasound has not been my clinical practice. I can appreciate that others find this a useful investigative tool. However, I design my keystone flaps using the dermatomes as a neurovascular embryonic roadmap, overlying the muscle bellies where possible. Skeletonising perforators may cause undue kinking (eg garden hose effect). Keystone flaps based on these recognised perforator territories provide vascular support via either muscle or fascial layers. These fascial-lined island flaps may be undermined up to two thirds of the surface area. This retains, presumably, associated arteriovenous links which allow the continued success in the use of the keystone principle. Some of these would be too fine to be demonstrable by angiographic or latex injection studies.

In our technique, the most important part of raising any keystone flap is access down the convex side to the deep fascia. Division here allows this island bridge flap, pedicled on perforators, to sway as a single unit between two surgical defects. Full division of the fascia along this convex surface is essential to allow mobility of the island and visualisation of cutaneous structures ie perforators and accompanying venous channels. A dermal bridge¹ restricts the mobility of the island flap and may interfere with the vascular perfusion hypothesis we are trying to establish at an observational level.² A dermal bridge only serves to allay anxiety and it has not been part of my original design. In my estimate, the number of keystone flaps I have performed to