

# Registrar-to-registrar insights – essential tips for aspiring microsurgeons on early independent DIEP flap reconstructions

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Dear editor,

I am a penultimate year plastic surgery resident and have recently performed my first 20 independent deep inferior epigastric perforator (DIEP) flap reconstructions. Following the advice of my mentors, I made a report for myself after each reconstruction and learned numerous invaluable lessons that I wish I had known before embarking on this learning journey. I believe these insights could be of great value to fellow aspiring microsurgeons.

## Develop a roadmap and envision the procedure

Each unit operates differently, so I will not delve into specifics. However, having observed enough DIEP flaps, it is crucial to formulate a step-by-step surgical plan detailing the entire procedure from start to finish. Envision these steps thoroughly in your mind. For instance, and this can be detailed, consider what your left hand is doing while dissecting out the umbilicus. We know that surgical priming improves performance during training and it saves you stress and surgical time [1].

## Master the computed tomographic angiography

Although many surgeons already create a map of the perforators, a computed tomographic angiography (CTA) provides extensive information that can simplify intraoperative decision-making. Aim to conceptualise a 3D map of the perforators, identifying which can be harvested

together and which cannot. When selecting perforators for a DIEP flap, it is also advisable to choose those connected to the superficial venous system, as this can help prevent venous congestion (Fig. 1) [2]. Develop a mental roadmap for the perforators to target, clamp, and think about how you would like to approach them. Understand how the perforators run beneath the muscle fascia to plan your incision accordingly (e.g. if the perforator runs subfascial to lateral, make your incision medial to be safe). Locate the superficial inferior epigastric vein (SIEV), noting its depth and

size, which will streamline its identification and reduce operative time (if you know it lies 1 cm deep, you don't have to be overcautious when incising the dermis). Rozen et al. discussed this very nicely in their article on assessing CTA in autologous breast reconstruction [3].

## Distinguish between running and walking steps

One of my mentors emphasised that initial steps in a DIEP (umbilicus dissection, flap isolation, supra-umbilical flap undermining, SIEV dissection) are "running steps", requiring quick, steady progress



Fig. 1. Coronal CT angiography image of the abdomen illustrating the connection between a perforating vessel and the superficial venous system.

to allocate sufficient time for the “walking steps” (perforator selection, dissection, microsurgery). The running steps are very similar to the initial steps of an abdominoplasty and should not take up too much of your time. This is crucial during the initial stages to ensure ample time for meticulous perforator dissection and helps to prevent your supervisor from needing to intervene due to time constraints.

### Create a comprehensive “flap divide” checklist

Once you successfully raise your first flaps independently, a significant burden is lifted, but this marks only the midpoint. At this juncture, the flap must be disconnected and anastomosed to the recipient vessels, a process involving numerous critical steps that can be overwhelming. Therefore, breaking down these steps into a standardized checklist is essential for navigating this phase effectively. As Robert Acland once aptly stated, success in microsurgery is the result of a series of well-defined steps. See below my “flap divide” checklist (Tab. 1).

### Preparation for microanastomosis

Preparation for microanastomosis is a critical and complex aspect of independent free flap reconstruction. This step can sometimes be overlooked when not serving as the primary surgeon, but it is as crucial as the anastomosis itself [4]. Key considerations include determining the optimal transection point for the recipient vessels, positioning the pedicle before and after anastomosis, and securing the flap. It's important to decide how much adventitial tissue to remove and how to balance the lengths of the recipient and flap vessels. My technique involves positioning the flap over the recipient vessels until the pedicle naturally aligns, indicating it is in a relaxed position. The flap is secured to the sternum with staples or sutures, and a minimal amount of adventitial tissue is removed.

Tab. 1. “Flap divide” checklist.

#### 1) Flap ready to be divided?

- A. Is the flap well-perfused on its remaining perforators?
- B. Is the flap fully islanded on the perforators?
- C. Is the pedicle completely freed from surrounding tissue?
- D. Are the pedicle and vein orientations clearly marked?

#### 2) Recipient vessels ready for flap?

- A. Are recipient vessels fully dissected, with branches clipped and sufficient length available?
- B. Have background preparation, marking, and topical vasodilator been applied?
- C. Is exposure optimal, with fishhooks well-positioned, hemostasis achieved, and the breast pocket fully dissected?
- D. Is a wet swab covering the fishhooks to facilitate flap positioning?

#### 3) Microscope and instruments

- A. Is the microscope functional and ready?
- B. Are the micro instruments prepared?
- C. Is the stool available?

The artery and vein are split for approximately 2 cm. After completing the venous anastomosis, the pedicle is lightly tensioned, and the flap artery is transected flush with the recipient artery. The final goal is to position the pedicle in the most natural, minimally twisted and uncurved configuration possible.

### Maximise efficiency with teamwork

It is crucial not to undertake everything alone but to ensure efficient teamwork. During initial DIEP procedures, you will likely be in a training centre with fellow assistants, registrars, or senior house officers who can contribute at their level. Reducing surgery time benefits everyone and encourages support from the team for future cases (e.g., anaesthetists, operating theatre staff). Tips include having a teammate close the abdomen during microsurgery, releasing recipient vessels as soon as the breast surgeons complete their work, and preparing recipient vessels to such an extent that immediate microsurgery can be undertaken (e.g., background setup, vessel marking, adequate length, adventitial clearance).

#### Roles of the authors

All authors contributed equally to this work.

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