

Pre-expanded Super-Thin Skin Perforator Flaps



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KEYWORDS

- Pre-expansion • Pre-fabrication • Super-thin flaps • Perforator flaps • Skin flaps
- Crossing-area blood supply

KEY POINTS

- The ideal skin flap should be large enough for adequate coverage but thin enough to match the regional anatomy of each particular anatomic area.
- A super-thin skin perforator flap is created via pre-expansion during the first stage operation.
- A tissue expander is placed essentially under the subdermal vascular plexuses based on the location of identified 2 or more adjacent perforators.
- Our preferred technique can create a large super-thin skin flap that has prefabricated blood supply.
- The flap can be used to reconstruct a large surface skin defect with a “like-for-like” tissue.

INTRODUCTION

Perforator flaps were first described by Koshima and Soeda in 1989. They are adipocutaneous flaps within which blood is circulated through a cutaneous perforator artery and its vena comitae. Since then, perforator flaps have been used widely by many plastic surgeons to reconstruct various soft tissue defects with good success.^{1–3}

Reconstruction of a large superficial open area in the face, body, or extremity area with a “like-for-like tissue” is an ongoing challenge for plastic surgeons. The ideal skin flap should be large enough for adequate coverage but thin enough to match the regional anatomy of each particular anatomic area. This may be especially true for the face, neck, and hand or finger, where there is a need for such a super-thin skin for reconstruction. Our group’s innovative approach to reconstruct extensive postburn surface scar contracture is based on the theory of “bridging” of the neighboring axial pattern flap.⁴ We

combine this theory with pre-expansion to acquire the desired large flap that has “prefabricated” blood supply so that such a flap can be used to reconstruct a large surface skin defect with a “like-for-like” tissue for a more desirable outcome.

Super-thin flaps, by their definition, are primarily thinned to the layer where the subdermal vascular network (subdermal plexus) can be seen through the minimal fat layer.⁵ Over the last 10 years, super-thin skin perforator flaps have been used widely by these authors to reconstruct various defects after release of postburn face, neck, or hand scar contracture with a good success. A super-thin skin perforator flap is created via pre-expansion during the first stage operation where a tissue expander is placed essentially under the subdermal vascular plexuses based on the location of identified 2 or more adjacent perforators. In this article, we introduce our preferred pre-expanded super-thin skin perforator flap and its clinical application for reconstruction of large

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skin defect after release of postburn scar contracture in the face, neck, or other part of body.

TREATMENT GOALS AND PLANNED OUTCOMES

In the past, the pre-expanded random skin flap is designed with a wide pedicle. However, the flap could not cross the midline of the face or neck and survive well without an adequate length of the pedicle. During the pre-expansion of the skin perforator flap, we believe the diameter of adjacent communicating branches increases. Because more perfusion occurs through these communicating branches, it is possible that the blood from the subcutaneous perforators of 1 supplying artery can flow into other perforators through the communicating branches. Thus, the flap can be designed significantly larger with a narrower pedicle as long as the perforator is not injured. With this narrower pedicle, the flap can be rotated easily. Again, the color, character, and thickness of the pre-expanded flap are more able to mimic the normal skin of the face, neck, or other part of the body.

During pre-expansion, the “bridging effect” can merge 2 neighboring axial flaps into 1 larger cross-area flap. The advantages of this flap are not only its larger size and thinner contour, but also its ease of rotation and malleability. Thus, this kind of pre-expanded super-thin skin perforator flap can be used to reconstruct a large skin defect after

release of the massive postburn cicatrix without significant donor site deformity. It may have an essential role in reconstructing a large face or neck defect, a region where both aesthetic appearance and functional result are required. Therefore, with the application of our preferred pre-expanded super-thin skin perforator flap for indicated reconstructions, patients may have more optimal reconstructive and aesthetic outcome with “like-for-like” tissue but minimal donor site scarring and other morbidity.

PREOPERATIVE PLANNING AND PREPARATION

The mechanism to improve pre-expanded flap survival is thought to be the “bridging effect” through prefabrication of the blood supply within the flap. First, pre-expansion of the flap can change choke anastomoses into real anastomoses and bridge 2 neighboring axial vessels (**Fig. 1**). Second, the perfusion of the flap may be improved by neovascularization and dilation of vessel’s caliber during the pre-expansion from adjacent perforators (**Fig. 2**). Importantly, the positive effect of pre-expansion on the blood supply of a crossing area to the flap has been confirmed experimentally in our previous study and, thus, pre-expansion of a perforator skin flap can be applied clinically with possibly good success.⁶

To identify perforators as part of the preoperative planning for creation of super-thin skin

Pre-Fabrication of Blood Supply Within Expanded Skin Flap

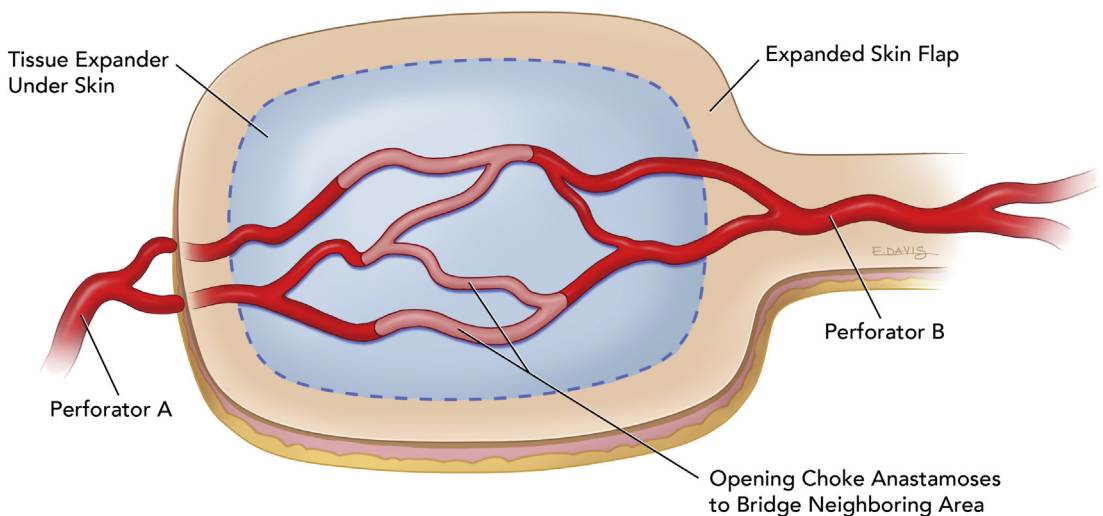


Fig. 1. Improving the blood supply of a pre-expanded skin perforator flap. The “bridging effect” through opening of choke anastomoses between 2 neighboring area has been considered as one primary mechanism for pre-fabrication of the blood supply within the flap. (From Wang CM, Pu LLQ. Pre-expanded super-thin skin perforator flap. QMP’s Plastic Surgery Pulse News 2016;8:1 A Featured Article Focus on Flap; with permission.)

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