The Diagonal Upper Gracilis (DUG) Flap: A Safe and Improved Alternative to the TUG Flap

Erez Dayan, M.D., Mark L. Smith, M.D., Mark Sultan, M.D., William Samson, M.D., Joseph H. Dayan, M.D.

Introduction
The transverse upper gracilis (TUG) has been successfully used for autologous breast reconstruction. However, concerns regarding wound healing, lymphedema, and cosmesis at the donor site have limited its widespread use. The Profunda Artery Perforator (PAP) flap is a useful alternative that has addressed some of the morbidity associated with the TUG. However, the PAP flap may result in distortion of the gluteal crease and lead to sensory changes in this region.

In this study we describe a new flap design: the DUG (Diagonal Upper Gracilis) flap. The axis of the DUG flap skin paddle is oriented in an oblique and posterior fashion parallel to Langer’s lines. This allows recruitment of a wider skin paddle with less tension on the line of closure. The lymphatics from the lower extremity are avoided and the scar is not visible on frontal and lateral views. The purpose of this study was to describe the technique for flap harvest and evaluate its outcomes.

Methods
A retrospective study was performed on 9 consecutive patients who underwent 10 DUG flaps. Preoperatively, magnetic resonance angiography was used to identify the optimal donor thigh. Donor site morbidity and surgical complications were evaluated.

Results

Operative Technique
The anterior border of the skin paddle is oriented along the prominence of the adductor longus and curved posteriorly. A symmetric ellipse is then completed, parallel to Langer’s lines (Figure 1). Dissection begins along the anterior edge of the flap and carried down through the adductor longus fascia. The fascia is reflected medially, exposing the gracilis pedicle which is mobilized to its origin from the profunda femoris artery.

Figure 1. DUG Flap pre-operative markings
**Clinical Outcomes**
Two flaps were performed for partial breast reconstruction and eight flaps were used for post-mastectomy reconstruction. All flaps survived. The flap weights ranged from 114 grams to 210 grams. There were no surgical complications at the donor site. All patients ambulated without restriction on post-operative day one. All donor sites healed uneventfully without pain, seroma, or lymphedema (Figure 2). There was no palpable fat necrosis to date.

![Figure 2. Donor site](image)

**Conclusion**
The DUG flap is a safe and effective alternative for breast reconstruction. An obliquely oriented skin paddle as opposed to a transverse skin paddle allows for greater recruitment of tissue with less tension on closure, avoids lymphatics, and does not distort the gluteal fold.