

# The Superiorly Based Partial Rectus Abdominis and External Oblique Flap: A New Technique for Breast Asymmetry Reconstruction

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**Summary:** Breast asymmetry has a wide spectrum of presentations with several employable strategies for surgical correction. Historically, the external oblique muscle has proven to be a versatile flap option for the reconstruction of both local and distant defects. It has also been described for use in breast reconstruction for coverage of the lower pole of implant prostheses. The external oblique muscle flap can be harvested in several ways to capture overlying fat and skin. In this study, we describe the use of a superiorly based partial rectus and external oblique flap for surgical correction of lower pole breast hypoplasia. This flap provides vascularized autologous volume to the lower pole of the breast with minimal donor morbidity. Other advantages of this flap are that it can increase the nipple to inframammary fold distance and lower the inframammary fold. This technique represents an evolution of an under-utilized flap and is the first study describing the use of the external oblique flap in the management of breast asymmetry. (*Plast Reconstr Surg Glob Open* 2017;5:e1580; doi: 10.1097/GOX.0000000000001580; Published online 1 December 2017.)

## INTRODUCTION

Breast asymmetry has a wide spectrum of presentations with similarly varied physical and psychosocial effects.<sup>1</sup> There are a wide range of strategies that have been employed to surgically correct the breast asymmetry.<sup>2</sup> These strategies usually include a combination of skin and/or breast parenchyma modification with or without the addition of a prosthesis to one or both breasts.<sup>2</sup> We report the use of a superiorly based partial rectus and external oblique flap (SPREO flap)<sup>3</sup> to correct both the volume and skin shortage of a breast with lower pole hypoplasia. This represents an evolution of an under-utilized flap, and to the best of our knowledge, the first report describing the use of the external oblique flap in the management of breast asymmetry.

## SURGICAL TECHNIQUE

A 46-year-old female with a medical history of asthma and gastric sleeve insertion presented with breast asymmetry. She had a smaller left breast that was hypoplas-

tic in the lower pole, with a higher inframammary fold (IMF) and shorter IMF to nipple distance (Fig. 1). Her clavicle to nipple distances were the same for both breasts. Reconstructive options were discussed with her, and the patient was counseled about a type III SPREO flap. Dissection commenced by developing a subpectoral pocket by releasing the inferolateral insertion of the pectoralis major muscle to the chest wall. The anterior border of the serratus anterior muscle was raised. Skin flaps were raised in a supra-fascial plane from the inframammary fold to just below the level of the costal margin to expose the upper part of the rectus abdominis muscle as well as the supra-costal portion of the external oblique muscle. The level of the inframammary fold was marked to indicate the limit of the superior elevation of the SPREO flap. The caudal extent of the flap was marked to include an upper outer quadrant of the upper part of the rectus abdominis muscle (leaving a medial musculo-tendinous cuff at the xiphisternum to maintain continuity of the rectus muscle) and the external oblique muscle 1 cm above the palpated costal margin. The flap was raised and up turned from medial to lateral in a cephalad direction to the predetermined inframammary fold (Fig. 2). Perforators from the intercostal spaces were ligated until the flap had been sufficiently raised. Perforators at the fifth to sixth intercostal space were preserved. The free cut edge of the up turned external oblique and partial rectus abdominis was sutured to the inferolateral free border of pectoralis major. The

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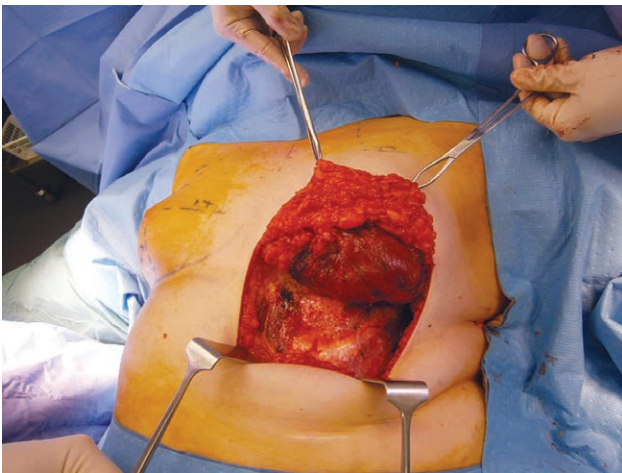
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**Fig. 1.** Preoperative photograph of the patient presenting with breast asymmetry.



**Fig. 3.** Postoperative photograph of the patient.



**Fig. 2.** Flap placement at the lower pole of the left breast.

free edge of serratus was sutured to the lateral free edges of the SPREO and pectoralis major muscle. The IMF was not reanchored to the chest wall, the nature of the flap creates a deep and fixed IMF by default. The cut edge of the external oblique muscle was not refixed to the costal surface, and the donor site was not quilted. Drains were inserted in the subcostal region. The patient recovered well with a satisfying aesthetic result and reported no functional loss and minimal sensory changes to the subcostal region (Fig. 3).

## DISCUSSION

Historically, the external oblique muscle has proven to be a versatile flap option for the reconstruction of both local and distant defects.<sup>4</sup> It has been used as a tubed pedicled flap, as a laterally based musculocutaneous pedicled flap, as an advancement flap with inguinal relaxing incisions, as a laterally based turnover flap, and as a free flap.<sup>4-6</sup>

The SPREO flap aims to utilize the inherent strengths of the flaps described by Bohmert<sup>7</sup> in 1991 and Isken et

al.<sup>8</sup> in 2009, while improving the quality and morbidity profile of the flap.

Bohmert<sup>7</sup> published his series of external oblique rectus musculofascial turnover flap for immediate breast reconstruction. He described a much larger flap extending below the costal margin as well as transecting the rectus abdominis completely to the midline. He reported good outcomes with the flap but encountered complications in the 2 patients where bilateral flaps were harvested. Both of these patients encountered severe back pain, and 1 developed a hernia in the epigastrium.

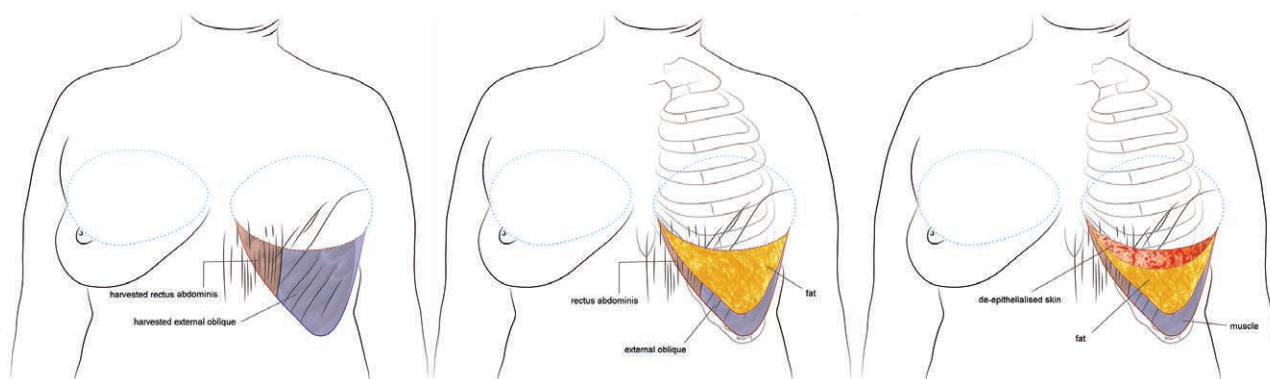
Isken et al.<sup>8</sup> in 2009 described a similar technique in which they harvested a superiorly based flap made up of external oblique fascia and anterior rectus sheath over the upper abdomen to cover the lower pole of a prosthesis. The difference being that the flap that Isken et al.<sup>8</sup> described was primarily a fascial flap. If the fascial flap appeared weak or too thin, little split muscle fibers were included in the proximal portion of the flap to provide added thickness.

## SPREO Flap

The concept of the SPREO flap is to limit the surface area of the flap to decrease the chance of truncal instability and herniation, while maintaining the thickness and usefulness of the muscle for lower pole prosthesis coverage. The SPREO flap limits the size of the flap to a level just above the costal margin. Above this level, and below the IMF, there are no other muscles. In this region, herniation is not possible due to the protection of the lower rib cage. In addition, the rectus abdominis is not transected completely to the midline. Instead, the rectus abdominis is kept in continuity at its most medial point at the sternal attachment by a small musculo-tendinous cuff. Within these peripheral limits, all the fascia and muscle is harvested exposing the posterior rectus sheath and underlying costal surface.

## Anatomy

The external oblique muscle is the largest and most superficial of the 3 flat muscles that encompass the an-



**Fig. 4.** External oblique musculofascial flap types I, II, and III. Type I—partial rectus abdominis and partial external oblique with the overlying fascia; type II—muscular flap plus subcarpas fat over the muscular portion of the flap; type III—additionally includes deepithelialized skin paddle.

terolateral abdomen.<sup>9</sup> It arises from each of the lower 8 ribs just anterior to their anterior extremities.<sup>10</sup> The upper 4 slips interdigitate with the lower slips of serratus anterior.<sup>10</sup> From its fleshy origin, the muscle fans out to a very wide aponeurotic contribution to the anterior layer of the rectus sheath.<sup>10</sup> The free upper border runs horizontally from the fifth rib to the xiphisternum.<sup>10</sup> From this, the lowermost fibers of pectoralis major arise. Above the level of the costal margin and below the level of the fifth rib, there is no other muscle between skin and the costal surface, except the vertical fibers of the rectus abdominis centrally.<sup>10</sup>

The understanding of the blood supply of the external oblique muscle has been refined by studies over several decades.<sup>9,11,12</sup> The muscle was initially thought to have a purely segmental blood supply from cutaneous perforators from the lower 8 posterior intercostal arteries.<sup>12</sup> With arterial injection, the studies by Kuzbari et al.<sup>9</sup> and Schlenz et al.<sup>11</sup> demonstrated additional significant blood supply from the deep circumflex iliac artery. The intercostal perforators to the external oblique muscle are placed along an anteriorly convex line, which curves infero-posteriorly toward the lumbar fascia from the level of the fifth rib in the mid-clavicular plane.<sup>11</sup>

The rectus abdominis is a para-midline strap-like abdominal muscle that has origins from the pubic symphysis and the upper border of the pubic crest.<sup>10</sup> It lies edge to edge with its contralateral counterpart and inserts into the fifth to seventh costal cartilages.<sup>10</sup> It has dual dominant blood supplies from the deep inferior epigastric artery and from the superior epigastric artery.<sup>12</sup> It also has numerous small segmental contributions from the lower 6 intercostal arteries.<sup>12</sup>

#### Flap Types

The external oblique muscle flap can be harvested in several ways to capture overlying fat and skin (Fig. 4).

- Type 1—The most common flap, consisting of the partial rectus abdominis and partial external oblique with the overlying fascia.

- Type 2—The second most common variation of the flap. It additionally includes the fat deep to Scarpa's fascia over the muscular portion of the flap. Type 1 and 2 flaps can be harvested through any traditional mastectomy incision as well as an inframammary approach.
- Type 3—This can only be offered when an inframammary approach is planned. It includes the partial rectus abdominis muscle, the partial external oblique muscle as well as the overlying fat and deepithelialized skin paddle. The skin paddle is designed in a curved ellipse along the line of the intended inframammary fold.

A type 3 SPREO flap was used in the patient we described previously. This flap provides vascularized autologous volume to the lower pole with minimal donor morbidity. The advantages of the SPREO flap is that it can increase the nipple to IMF distance, lower the IMF, and add more volume to the lower pole of the breast. We experienced no complications using the SPREO flap in this patient, and the donor site was not a focus of the patient's recovery.

#### SUMMARY

We present a new technique that may be considered for the surgical correction of breast asymmetry when there is a predominantly lower pole deficit. However, the most common use of the SPREO flap by the senior author is in the coverage of the lower pole of prostheses in breast reconstruction. There is a series of such cases being colated for publication in the near future.

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