Pedicle Choices in Breast Reduction

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> By failing to prepare,
> you are preparing to fail.
>
> *Benjamin Franklin*
>
> Surgeons should choose the right technique for the right patient. We plastic surgeons may be artists, but even artists still need to plan and to trace lines to create beautiful works.
>
> *M. Hamdi*

Introduction

Breast reduction surgery usually combines a skin and parenchymal resection with a pedicle to maintain blood supply to the nipple-areola complex. This pedicle should allow adequate movement of the nipple to its new, more elevated position [1–3].

The design of the pedicle depends on sound knowledge of the blood supply to the breast (Fig. 2.1). As pointed out by Reid and Taylor [3], Corduff and Taylor [4], the main arterial supply to the breast enters superficially and descends into the parenchyma at the level of the nipple and areola [1]. There is also a major perforator that comes up through the pectoral muscle just medial to the breast meridian at approximately the level of the fifth/sixth intercostal space. Taylor also makes it clear that the veins are superficial and do not accompany the arteries [2].

It is key to preserve blood supply to the nipple areola complex; however, it is also important to preserve sensation and breastfeeding potential. A dermal pedicle alone may have adequate circulation, but it is less likely to provide sensation (Fig. 2.2) and is unlikely to have any breastfeeding potential. It may appear that a full-thickness dermoglandular pedicle would be the ideal option; however, there can occasionally be difficulties with inset, resulting in compression and torsion of the pedicle such that the blood supply is compromised. The classification that follows is necessarily arbitrary, and variations thereof can and will be used; it does, however, provide a basis for pedicle planning and design (Fig. 2.3).

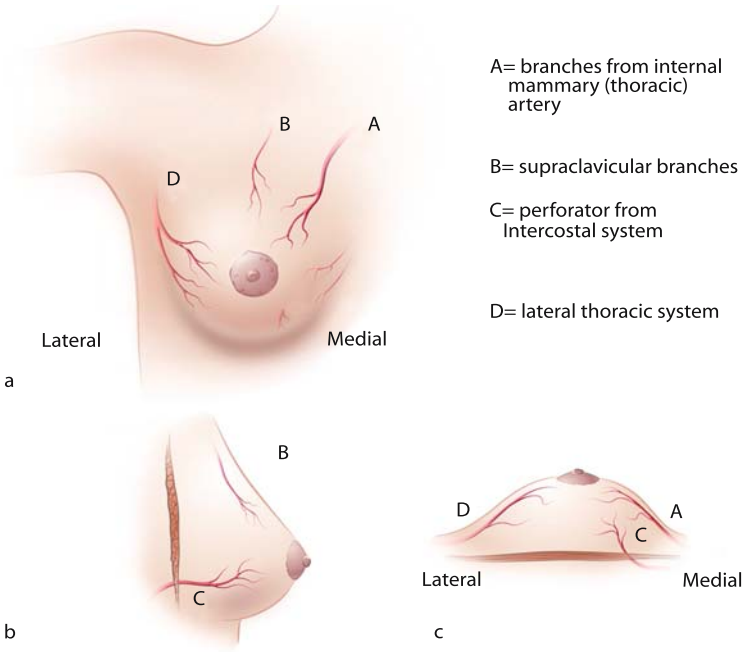

Fig. 2.1 a–c. Arterial anatomy of the breast. **a** Anterior view. **b** Lateral view. **c** Coronal view

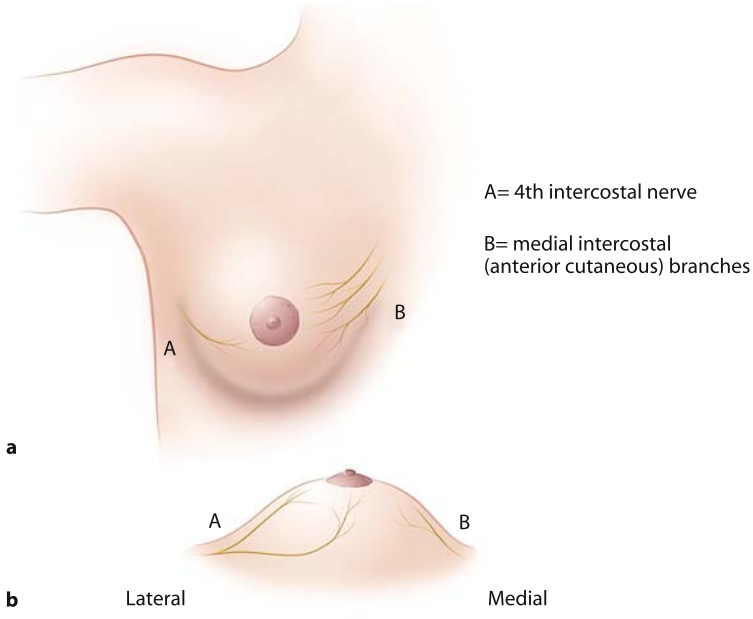

Fig. 2.2 a,b. Innervation of the breast. **a** Anterior view. **b** Coronal view

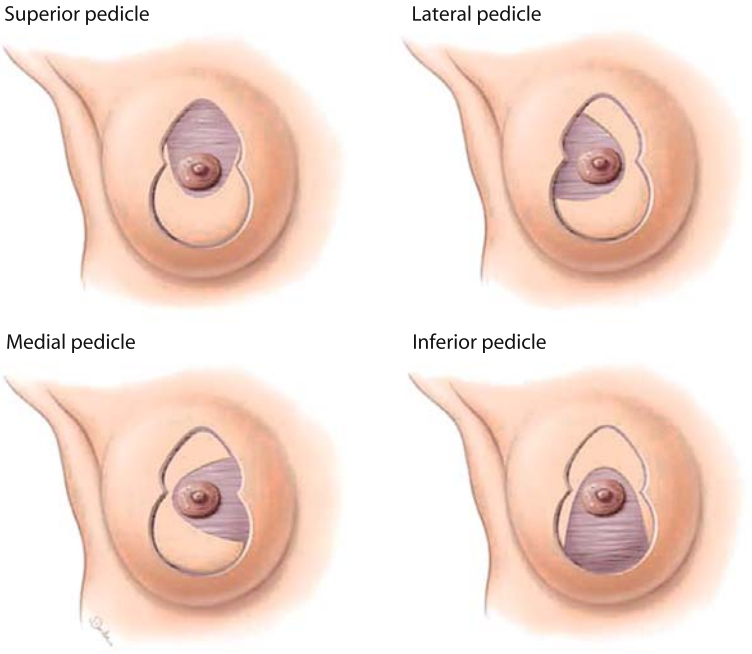

Fig. 2.3. Various pedicles for the nipple-areola complex

Inferior Pedicle/Central Pedicle

The inferior pedicle has become the mainstay of breast reduction surgery in North America. It relies on the perforator from the fifth or sixth intercostal space that comes through the pectoral muscle into the breast parenchyma just medial to the breast meridian. This perforator does have an accompanying vein. Both the inferior [5, 6] and central pedicles [7] can survive on the perforator alone, but one needs to be aware that occasionally this perforator is absent. In addition, the inferior pedicle has both venous drainage and arterial input through the inferior dermal bridge, which imbues it with some extra reliability.

Sensation to the nipple-areola complex is usually well preserved as long as there is some preservation of the tissue over the pectoralis fascia lateral to the pedicle. Austrian researchers [8] have shown that a major

branch of the fourth intercostal nerve travels just above the pectoralis fascia until the breast meridian, where it turns and passes upward toward the nipple-areola complex (Chap. 1). Sensation can therefore be preserved using both the inferior and central pedicles. Some surgeons rotate the base of the pedicle more laterally in an effort to incorporate more sensory innervation. Breastfeeding potential is preserved with both pedicles because there is little to no interference with the ductal system.

Superior Pedicle

The superior pedicle may be either dermal or full thickness dermoglandular [9, 10]. The full-thickness pedicle is more difficult to inset but is more likely to preserve breastfeeding potential. Innervation is superficial and comes down from the clavicular area. Sensation is therefore preserved with both types of superior pedicle.

The arterial blood supply is relatively constant with a major vessel from the internal thoracic (mammary) system. Taylor has demonstrated that this vessel originates from the second or third interspace [4] and runs obliquely downward toward the nipple. The angle taken by this vessel will depend on the degree of breast ptosis. It enters the breast at the level of the breast meridian but will be located more medially the greater the distance cephaled to the nipple. It is because this vessel is very superficial and can always be found about 1 cm deep to the skin surface that the superior pedicle can be quite radically thinned. In fact, trying to inset a full-thickness superior pedicle can compromise nipple-areola circulation secondary to compression.

Lateral Pedicle

The lateral thoracic vessels descend at an oblique angle and enter the breast superficially. This means that both dermal [11] and dermoglandular pedicles [12, 13] will have adequate arterial input; and venous drainage is likewise superficial. Since the fourth lateral intercostal nerve has both a deep and a superficial branch, sensation is well preserved with either a thick or a thin pedicle [14, 15]. A full-thickness laterally based pedicle is more likely than a dermal pedicle to preserve ductal tissue.

The lateral pedicle is relatively easy to rotate into position. The main drawback of the lateral pedicle is the resultant lateral fullness of the breast if the pedicle is left too full. This may require later resection or liposuction, which in turn may compromise the pedicle itself.

Medial Pedicle

The medial pedicle is sometimes described as a "superomedial" pedicle because it will often appear to be quite superior, especially with the more ptotic breast [13]. Keeping some superior tissue does preserve vascularity, but retaining too much superior tissue will interfere with the ease of inset.

The blood supply to the medial pedicle is provided by several smaller branches from the internal thoracic (mammary) system (third to sixth intercostal spaces). Since these vessels enter the breast at a superficial level, the pedicle can be either dermal or full thickness dermoglandular. The large artery that provides circulation to the superior pedicle will usually be cut as it descends obliquely toward the nipple; however, some side branches may be preserved.

A full-thickness dermoglandular pedicle (taken directly down to the breast meridian) is more likely to preserve sensation since the deep branch of the fourth intercostal nerve, which travels just above the pectoralis major muscle, can be preserved. It is therefore important to leave some tissue over the muscle during parenchymal resection.

As with the other pedicles, a full-thickness pedicle is more likely to preserve ductal tissue and allow the possibility of breastfeeding in the future.

Discussion

The aim of all mammaplasty techniques is to reduce breast volume while improving breast shape and position. However the techniques also endeavor to maintain circulation, sensation, and ductal integrity to the nipple-areola complex. A dermoglandular or central pedicle is most likely to achieve the ultimate goal. Basing the pedicle on one of the four major orientations outlined above may confer advantages to one pedicle over another depending on the degree of breast hypertrophy and nipple ptosis as well as on patient expectations and the surgeon's experience [16]. Advantages and disadvantages of each pedicle are summarized in Table 2.1.

The superior pedicle, which is widely used in continental Europe, is more suited to mastopexy and reduction of less than 1000 g per breast [9, 10]. More challenging cases require more experienced surgeons to handle the remaining tissue and be able to mold it into an aesthetically pleasing shape. The shape of the breast often looks unsightly in the early stages because of the folded pedicle and the exaggerated narrowing and projection of the reduced breast. Once the breast settles, the final shape is excellent and, most importantly, long-lasting results can be achieved. The

Table 2.1. Advantages and disadvantages of the various breast reduction pedicles. Some drawbacks can be overcome with adequate experience. *NAC*, nipple-areola complex

	Amount of gland resection	Breast projection	NAC sensitivity	Ability to breastfeed
Superior pedicle	++	+++	+	+
Inferior pedicle	+++	+	++	++
Lateral pedicle	++	+++	+++	++
Medial pedicle	+++	++	++	++

pedicle should be thinned enough to avoid kinking and/or venous congestion, which may result in nipple-areola complications. Sensitivity of the nipple-areola complex is significantly decreased with techniques that use a superior pedicle, particularly during the early (up to 6 months) postoperative period [17, 18]. Patients who have highly sensitive nipple-areola complexes or who are very anxious about nipple-areola complex sensitivity loss are better served by an alternative pedicle.

The inferior pedicle is widely used in North America, the U.K., and Australia [5, 6]. The pedicle has a robust blood supply and a relatively reproducible outcome, which is why it has been used for so long. Sagging of the pedicle is unavoidable at long-term follow-up and likely to occur more frequently than with other pedicles; thus favorable aesthetic results that are long lasting are more difficult to achieve with the inferior-pedicle-based mammaplasty. Modifications in the design of the inferior pedicle such as using anchoring to the thorax or tightening the closure of the vertical pillar can provide more reliable results [19]. The inferior pedicle can be ideally used for very large breasts with considerable ptosis in which the nipple actually points to the ground. The length of the inferior pedicle may be shorter than that of any other pedicle. Nipple-areola sensitivity is better preserved if the pedicle is shifted more laterally to include the deep branch of the fourth intercostal nerve.

The lateral pedicle can be used in large breasts instead of the superior pedicle to avoid pedicle kinking. This pedicle has major advantages in terms of arterial input and breast sensation; branches from the lateral thoracic artery contribute to the blood supply, and the deep branches of the fourth intercostal nerve are incorporated. The main problem with the lateral pedicle is occasional persistent lateral fullness in cases of insufficient resection of the pedicle due to anxiety concerning vascularity of the pedicle [13]. Designing a superolateral pedicle [12] may reduce this problem, but then preservation of the deep branch of the fourth intercostal nerve would not be possible. Basing the lateral pedicle on the horizontal septum described by Würinger et al. [20] (Fig. 2.4) would allow inclusion of this branch. Septum-based lateral mammaplasty gives

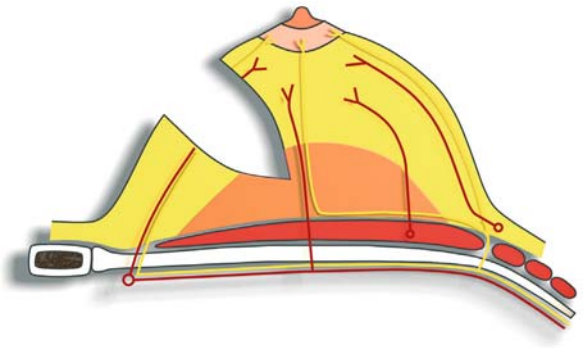

Fig. 2.4. A cephalic view of the right breast, which shows the blood and nerve supply to the septum-based lateral pedicle

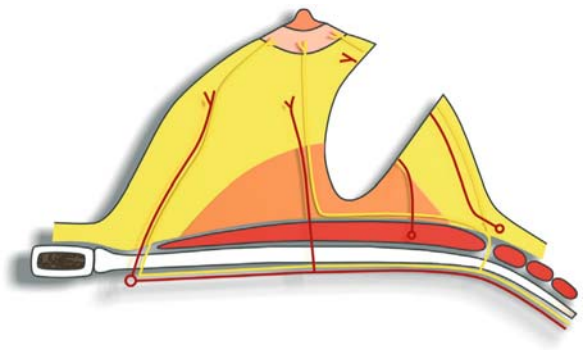

Fig. 2.5. A cephalic view of the right breast, which shows the blood and nerve supply to the septum-based medial pedicle

excellent results in terms of preservation of nipple-areola complex sensitivity [14] (Chap. 9), and it is recommended for young patients who have exacting demands on preservation of nipple sensitivity. Good aesthetic results are obtained using this technique for moderate breast hypertrophy or for mastopexy.

The medial pedicle seems to be the most logical design for breast reduction [13]. It is shorter than the superior one and has a rotation inset rather than a folding inset. It contains branches from the internal mammary perforators and sensory innervation from

the anterior rami of the intercostal nerves. Nipple-areola complex sensitivity is well preserved using the medial pedicle compared to the inferior pedicle [21, 22]. Moreover, if the medial pedicle is based on the horizontal septum, one can preserve the deep branch of the fourth intercostal nerve (Fig. 2.5), and in that way better preservation of the nipple-areola sensation can be obtained (Chap. 9). Due to its orientation, the medial pedicle has good potential for maintaining its shape. The pedicle is directed perpendicular to the pull of gravity, which causes breast sagging in an inferolateral direction. Techniques based on the medial pedicle (Chaps. 7 and 9) allow for significant gland resection, especially on the lateral side. On the other hand, nipple-areola projection is less than that for the lateral pedicle technique; this can be avoided by anchoring the medial pillar on the pectoralis major fascia at the level of the nipple.

Summary

There is no "best" way to perform breast reduction. As with any other procedure in plastic surgery, the best technique may be that one which the surgeon has mastered and with which he or she is most confident. In the following chapters, the reader will be exposed to different techniques using different or modified pedicles in breast reduction. The authors present the fruits of their experience and errors over many years of breast surgery. All of them have performed a variety of techniques before settling on their preferred way, again using the accumulated wisdom and experience of the surgeons before them. All the above-described pedicles or their modifications are reliable, and they may work in experienced hands for every breast reduction. However, some pedicles are preferred to others in different circumstances, and it is imperative that young surgeons be aware of the pros and cons of each pedicle in order to generate a good outcome.

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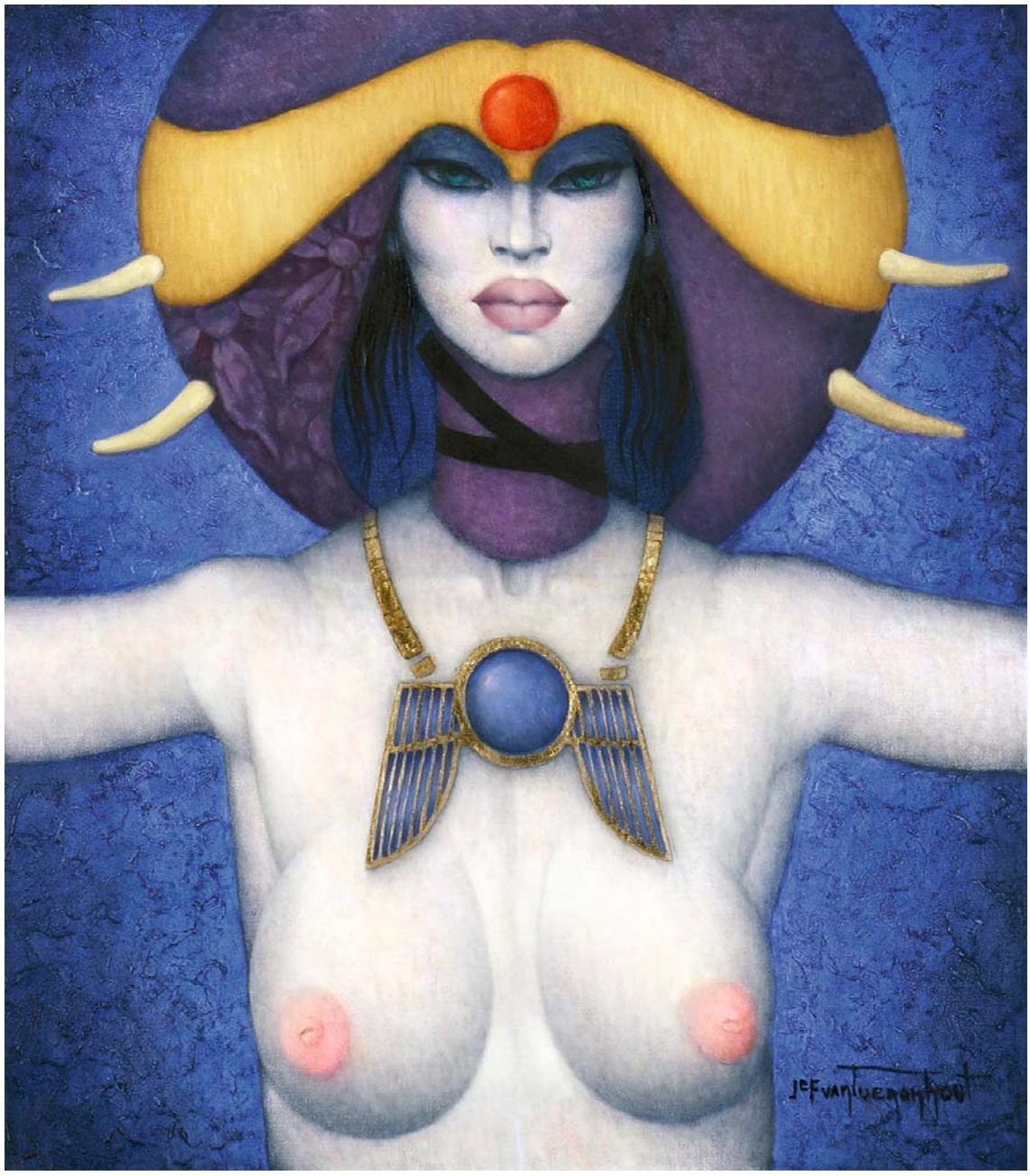
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