Non-microsurgical breast reconstruction

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ABSTRACT

Breast reconstruction after mastectomy should aim at resulting in an aesthetic outcome that matches the patient's expectations and without interfering in the oncologic treatment. Whether the reconstruction is performed immediately or in a delayed fashion depends on various factors, which needs detailed attention. Autologous tissue, implants or both are used in the reconstruction. This article reviews the current concepts in these, with emphasis on non-microsurgical methods of using the autologous tissue for reconstruction. Breast conservation has become an accepted practice of treatment. Reconstruction in these situations as well as in an occasion when the surgery is done for failed breast conservation is discussed in detail. The article also reviews the various methods for nipple reconstruction available.

KEY WORDS

Breast reconstruction, post mastectomy reconstruction

GOALS OF POST-MASTECTOMY BREAST RECONSTRUCTION

The goal of post-mastectomy breast reconstruction is to produce an aesthetic result that is congruent with the patient’s expectations, without interfering with the oncological treatment of the patient’s disease. Aesthetic expectations of the reconstructed breast vary from patient to patient. Some patients are satisfied with a reconstructed breast mound that looks acceptable in clothing, whereas others would prefer a reconstructed breast that is identical to the resected breast. Preoperatively, patients should be educated about the available reconstructive options. The most appropriate option for breast reconstruction depends on patient’s aesthetic preferences, level of social support and physical condition and habitus. Through this educational process and surgeon-patient dialogue, the best surgical option can be decided upon. Nonetheless, the patient’s aesthetic wishes should not interfere with adjuvant therapy, such as chemotherapy or radiation therapy. Similarly, reconstructive procedures should not add unacceptable risks associated with delay of diagnosis of recurrent disease or operative morbidity or mortality.

TIMING OF RECONSTRUCTION

Breast reconstruction can be performed immediately after mastectomy or can be delayed several months. The optimal time for reconstruction depends upon the stage of breast cancer, the need for adjuvant therapy and which method of reconstruction the patient and multidisciplinary team have decided upon. This multidisciplinary team includes the reconstructive surgeon, general surgeon and medical and radiation oncologists.

Immediate breast reconstruction is performed directly after mastectomy, in one operation. This method of reconstruction has increased in popularity, with 40% of breast reconstructions performed this way. Immediate breast reconstruction is ideal for patients with early disease (stage I or II). Its advantages include decreased psychological trauma and less expense and morbidity, without adversely affecting the natural course of the disease. Furthermore, immediate breast reconstruction...
does not delay the detection of recurrence and does not result in poorer survival.[7-9]

Compared with delayed reconstruction, immediate reconstruction generally produces a better aesthetic result, as the native skin envelope and the inframammary fold are maintained, thus providing a non-contracted, non-scarred pocket for the reconstruction. A disadvantage of immediate reconstruction is the potential for delay of adjuvant therapy if postoperative complications occur. Furthermore, immediate reconstruction may be adversely affected by the just previously performed mastectomy. For instance, the mastectomy flaps may be too thin and devascularized or the thoracodorsal pedicle used for reconstruction may be damaged or in spasm as a direct consequence of axillary dissection.

Relative contraindications to immediate breast reconstruction include: 1) advanced breast cancer, stage III or greater, 2) postoperative radiation, as radiation exposure has been shown to negatively impact the reconstructed tissue, 3) and medical co-morbidities, such as severe obesity, cardiopulmonary disease and diabetes.

Delayed breast reconstruction is usually performed several months after the mastectomy. There are several advantages to delaying reconstruction. There are fewer complications compared with immediate reconstruction. If the patient is to receive post-mastectomy radiotherapy, then the damaged skin envelope can be excised prior to reconstruction. Furthermore, final pathology results of the breast cancer are available. Therefore, a more informed decision regarding reconstruction in the context of the entire treatment regimen could be made.

There are also disadvantages associated with delaying breast reconstruction. For instance, it prolongs the overall treatment of the patient and is often more technically challenging. As compared to immediate reconstruction, the creation of a new breast several months after the patient has undergone a mastectomy is more difficult secondary to scar formation. The thoracodorsal pedicle, which may be used for supercharging an autologous, pedicled flap or used for free tissue reconstruction, may be unusable if it is enveloped in scar tissue. Furthermore, radiation changes may compromise the skin envelope, thus resulting in a poorer final aesthetic outcome. As previously mentioned, delayed breast reconstruction requires at least two stages and is therefore less cost effective.[4]

**METHOD SELECTION**

Post-mastectomy breast reconstruction can be performed with implants, autologous tissue or a combination of both. In deciding upon the best reconstructive option, several criteria must be considered. Firstly, the surgeon must assess the condition of the native skin envelope and pectoralis muscle. If the native skin envelope is in poor condition, then implant coverage may become compromised. A better reconstructive option would be to recruit new skin from a distant location, such as with a TRAM or latissimus dorsi myocutaneous flap. Secondly, breast size and body habitus must be considered. If the patient is thin and does not have a sufficient abdominal pannus, then reconstruction with a TRAM flap may not be the best choice. In contrast, if the patient is obese, then TRAM reconstruction is also not indicated. Thirdly, medical factors play a large part in the decision making as well. If the patient is a smoker or has diabetes mellitus and would like autologous breast reconstruction, a free TRAM flap optimizes inflow to the flap as opposed to a pedicled reconstruction. Fourthly, chest wall irradiation plays a large role in the decision making process. If the patient will be undergoing radiation therapy, then not only must the proper method be selected but also the proper timing of reconstruction. Delaying reconstruction and using autologous tissue is the preferred reconstructive method for the patient receiving radiation. Finally, the availability of flap donor sites dictates which method to use.

**METHODS OF POST-MASTECTOMY RECONSTRUCTION**

**Direct implant placement without tissue expansion**

The simplest method of reconstruction is direct implant placement without prior tissue expansion. This type of reconstruction is only indicated in a small population of patients. The advantage of direct implant placement is that it can be done in a single stage, immediately after mastectomy. However, without prior expansion the subpectoral pocket is limited in size and can only fit a small implant. Furthermore, this technique is dependent upon the availability of post-mastectomy native breast skin to cover the implant. Because of these limitations and requirements direct implant placement is generally discouraged.
Recently, human acellular tissue matrix (AlloDerm) has been used to increase the size of the subpectoral pocket immediately following mastectomy. By approximating the allograft to the inferior border of the pectoralis major muscle, complete coverage over the implant can be achieved without the need for post-mastectomy tissue expansion. As a result, implant size is not limited to a small volume, resulting in improved breast shape and better symmetry with the contralateral breast mound.\[10\]

**Tissue expansion followed by permanent implant placement**

Tissue expansion followed by permanent implant placement still remains the most common method of post-mastectomy breast reconstruction. The advantages to this method of reconstruction include: no additional donor site, less invasive surgery, less operative time, more rapid post-operative recovery and no delay in adjuvant chemotherapy if needed. Subpectoral implant placement following tissue expansion can reconstruct a small, non-ptotic breast after a skin-preserving mastectomy with good aesthetic results [Figure 1a-c].

Unfortunately, symmetry is unlikely in unilateral reconstruction. Manipulation of the contralateral breast, with either a balancing breast reduction or mastopexy, is often required. Other disadvantages include, unnatural feel, lack of natural ptosis and lengthy follow-up. Reconstruction with tissue expanders requires several months of clinic visits for skin expansion and requires at least one additional surgery to exchange the implant.

Implant reconstruction is indicated for women who want to avoid additional donor scars, prefer a quicker recovery, are small-breasted; require bilateral reconstruction and those women who are not candidates for autologous reconstruction. This method is contraindicated in women requiring radiation therapy to the breast. It is also contraindicated in women with thin native breast skin, as the implants are often palpable and there is risks for implant extrusion.

Complications of post-mastectomy implant reconstruction include infection, capsular contracture, deflation, extrusion and visible wrinkling of the implant. Eventually, the implant needs to be replaced, as its shelf life is about 10 years.

The expander size is chosen preoperatively by measuring the chest wall base dimensions of the breast. Tissue expander placement requires that the patient have viable mastectomy flaps. If blood flow to the mastectomy flaps is compromised, then it is best to delay the placement of the expander to avoid extrusion.
If the native breast flaps are viable, then the tissue expander is placed in a sub-pectoral pocket. The subpectoral pocket is created by freeing the pectoralis major muscle attachments to the sternum and costal margin. The inferior pole of the expander is usually not covered by the pectoralis major muscle, but can be safely left in a subcutaneous plane, consisting of subrectus fascia, external oblique muscle and serratus anterior muscle. Fascia-muscle flap is dissected off the chest wall in a medial to lateral direction towards the anterior axillary fold. The flap is dissected several centimeters below the opposite breast and the expander placed. Often this technique results in total coverage of the tissue expander and later of the permanent implant.

There are several important points to note when creating the pocket for the tissue expander. Firstly, when creating a pocket for the tissue expander it is important that the pocket dimensions match the expander width, so that the expander edges do not roll up. Secondly, the inframammary fold should not be altered. Thirdly, if the native breast skin flaps are thin, it is best to provide complete muscle coverage over the tissue expander and subsequently the permanent implant. This can be achieved by mobilizing the serratus anterior muscle laterally.

Once the expander is placed, it is then filled immediately to a volume that does not jeopardize the circulation to the overlying skin flaps. Two to three weeks following placement of the expander, when the breast incisions are healed, expansion may begin. Expansion proceeds on a weekly basis with 50 to 100 cc of saline added each visit, depending on how the overlying skin changes with expansion (e.g. tightness, erythema) and patient comfort. The expander is usually over-expanded by 25-50% to improve skin drape over the permanent implant. This redundancy in skin envelope size allows for differences in profile of implant versus expander and also allows for skin recoil post-expansion. After expansion is completed, an additional 2 to 4 months is allowed for tissue equilibrium to occur prior to implant exchange with either saline, silicone or biluminal (saline/silicone) permanent implants. Expansion can be performed safely during chemotherapy if the patient's blood counts are normal. If tissue expansion is delayed, scar contracture of the skin and soft tissue can impede the expansion process.

The tissue expander is removed via the old mastectomy incision. Inferior pole capsulectomy or radially directed capsulotomies may be required to lower the inframammary fold and to further increase the size of the implant pocket. The permanent implant is chosen based on breast width, height and the desired projection. They are selected to match the opposite breast in volume, shape and contour. The implant must be filled to volume specification to prevent significant rippling and implant failure. Overfilling distorts the implant spherically and may create scalloping at the periphery. On the contrary, underfilling has been shown to lead to implant rupture. Balancing breast reduction or mastopexy may be performed on the opposite breast at the time of implant exchange.

The two main types of implants used are saline and silicone. Implants can also either be textured or non-textured and round or anatomical. Textured implants have been shown to have a lower incidence of capsular contracture, with the additional benefits of preventing implant migration, thus resulting in a well-defined inframammary fold. However, they must be placed accurately at the time of implant exchange. Anatomical implants are teardrop shaped. They provide more projection than the round implants and thus are better suited for the patient with a narrow chest, constricted lower pole and glandular ptosis.

Permanent implants may also be placed either subpectorally or subglandular. Subglandular placement is better for correcting breast ptosis and breast shape. It is also better for controlling the inframammary fold and is associated with a faster post-operative recovery time. Subglandular implant placement seems to have better results with silicone implants. Compared with subglandular placement, the subpectoral technique hides the implant better, protects the implant from glandular bacterial exposure, results in less capsular contracture and is less bloody. However, the subpectoral placement also results in the implant migrating superolateral with time and shape can be distorted with pectoralis major muscle contraction.

The Becker implant is an inflatable breast implant with a detachable filling reservoir. Postoperatively, the implant can be filled to the desired volume via this filling reservoir. The implant may function as either a tissue expander or as a delayed-filling implant. The filling reservoir is removed once the desired breast size is achieved. This implant has been used successfully to immediately reconstruct the breast mound following modified and subcutaneous mastectomy. It has also been used for secondary reconstruction following radical mastectomy.
combined with the latissimus dorsi flap and following the removal of silicone gel implants with associated capsular contracture.[12]

AUTOLOGOUS TISSUE RECONSTRUCTION

Autologous reconstruction utilizes the use of body tissue for creating the breast. Autologous reconstruction has advantages and disadvantages. Advantages of using the patient’s own tissue includes a natural-feeling breast mound, a more natural appearing ptotic breast and single stage reconstruction. Disadvantages include an additional donor site with its morbidity, longer and more complex operation and fat necrosis.

Latissimus dorsi flap (Muscle or Myocutaneous)
The latissimus dorsi muscle is a large, triangular muscle. It has a type V blood supply, with the thoracodorsal artery being the dominant pedicle. However, the muscle may also be sustained by retrograde perfusion from the serratus branch if the thoracodorsal vessels are damaged proximally in the axillary region. It is this serratus branch that is often ligated and divided to gain greater axis of rotation.

The advantage of using the latissimus dorsi muscle for post-mastectomy breast reconstruction is that it can provide a single stage reconstruction when used as soft tissue coverage over an implant. Use of this flap obviates the need for pocket creation as it can provide adequate skin replacement in cases with a large native breast skin excision. [Figure 2a, b]. It has often been considered a reliable, “workhorse flap” for breast reconstruction.

Compared with implant reconstruction, the latissimus dorsi myocutaneous flap is a more complex procedure, requiring post-operative hospitalization and a recovery period of 2 to 4 weeks. There is also a significant donor site scar, especially if a skin paddle is harvested. Seroma formation is the most common donor site morbidity.[13] In addition, the standard latissimus dorsi myocutaneous flap does not provide sufficient volume for total autologous reconstruction, thus requiring implant placement deep to the flap.

The latissimus dorsi myocutaneous flap is also indicated as a salvage procedure for those patients having undergone failed implants or TRAM flaps. It is also indicated for partial breast defects that do not require large volume soft tissue reconstruction and in patients who are not suitable for TRAM flap reconstruction but who desire autologous tissue reconstruction. These patient include obese patients, thin patients (inadequate abdominal pannus) and patients who lack intact superior epigastric vessels as it happens with open cholecystectomy.

Women with excess back and flank adipose tissue are often good candidates for the extended latissimus dorsi myocutaneous flap. The extended latissimus dorsi myocutaneous flap includes the adjacent parascapular and iliac subcutaneous tissue and fascia. Often a large volume of soft tissue can be harvested with the muscle in the obese patient, thus obviating the need for an underlying implant. Disadvantages of the extended latissimus dorsi flap include greater morbidity associated with a larger scar and higher incidence of seroma formation.

Transverse rectus abdominis myocutaneous (TRAM) Flap
Hartrampf[14] introduced the TRAM flap in 1982. The TRAM flap has since become the method of choice for autologous breast reconstruction. A large, elliptical skin island characterizes this flap, which is oriented transversely across the lower abdominal wall. As a result, the patient undergoes an abdominoplasty, along with the breast reconstruction [Figures 3a, b, c].

Perforators from the underlying rectus muscles supply the transversely oriented skin paddle and subcutaneous fat of the lower abdomen. These vessels come off the superior and inferior epigastric vessels; perforate the muscle, to supply the overlying subcutaneous fat and skin. The pedicled TRAM flap is based on the superior epigastric artery. The flap is transposed from the abdominal wall to the mastectomy defect via a tunnel created under the remaining abdominal wall at the medial aspect of inframammary fold.

The TRAM flap has a type III pattern of circulation. The dominant vessels that supply blood to the flap are the superior epigastric artery (used for pedicled flap) and the deep inferior epigastric arteries (used for free tissue transfer). The cutaneous portion of the flap is divided into 4 zones (reliability: zone 1> 3> 2> 4)

The advantages of the TRAM flap are numerous. It provides a natural breast mound. It can provide enough tissue for total autologous reconstruction. It brings new skin
Non-microsurgical breast reconstruction

Figure 2a: Post mastectomy reconstruction using latissimus dorsi flap post op result
Figure 2b: Post mastectomy reconstruction using LD Flap post operative result lateral view showing Symmetrical projection
Figure 3a: Bilateral tram flaps marked in a patient undergoing bilateral mastectomy
Figure 3b: Post operative result
Figure 3c: Post operative result –lateral view

and soft tissue, based on its own blood supply, to the mastectomy defect. This is especially advantageous in the radiated breast.

Although there are numerous benefits to performing the TRAM flap, there are also several disadvantages. Firstly, it is a complex procedure, requiring several days of hospitalization, often with intensive pain management. This method of reconstruction is also associated with donor site morbidity, such as hematoma, seroma and hernia and abdominal wall laxity. Other complications include partial or total flap loss and necrosis of the umbilicus. If the flap is not well perfused, then fat necrosis can develop. Fat necrosis may result in calcifications, which may complicate post-operative cancer monitoring.

The TRAM flap is indicated for patients who desire autologous reconstruction and who meet certain requirements. These requirements are: 1) The patient must have an adequate abdominal pannus to create the breast mound and 2) the blood supply to the flap must not be damaged from prior surgery. Surgeries that entail
subcostal or paramedian incisions may result in a damaged flap pedicle. Two examples are the open cholecystectomy and the abdominoplasty.

A TRAM flap should be avoided in the significantly overweight patient, as the vascularity of the skin and subcutaneous flap is unreliable. Patients must also be medically fit to withstand the procedure. Relative contraindications to performing a TRAM flap include: smokers and patients with medical comorbidities, such as diabetes mellitus and cardiovascular and pulmonary disease.

**Bipedicled TRAM**

The bipedicled TRAM flap is based on both rectus abdominis muscles to reconstruct one breast. The advantage of using both muscles is that it allows for better blood supply to the flap, enabling a larger volume of soft tissue to be transferred. It is used in patients that have a high risk for flap loss, such as smokers, the obese and those who have undergone chest irradiation. One main disadvantage to this procedure is that the abdominal wall integrity is compromised, as both rectus abdominis muscles are transposed. To compensate for this donor site defect, a mesh closure of the abdominal wall is suggested.

**Delay procedure for pedicled TRAM**

The purpose of delaying a pedicled TRAM flap is to increase perfusion through the superior epigastric artery. This pre-harvest procedure is indicated in patients who are at risk for tissue necrosis of the flap due to poor blood flow. Such patients include smokers and those with an excessively large abdominal pannus. In addition, if a large breast mound is to be reconstructed, the delay procedure can increase the blood flow to zones 2 and 3 and thus more flap volume would be viable.

In comparing the two dominant vessels to the rectus abdominis muscle, inflow to the cutaneous perforating vessels is most direct from the deep inferior epigastric vessels. When the superior epigastric artery is used as the main blood supply to the rectus abdominis and overlying soft tissue, as in the pedicled TRAM flap, the blood flow must traverse the space between the superior and inferior epigastric arteries before reaching the perforators to the flap. Small conduits, called “choke” vessels span the space between the superior and inferior epigastric arteries. In order to improve blood flow to the flap through these choke vessels, many surgeons advocate utilizing a delay procedure.

Delaying a TRAM flap is performed by dividing the inferior epigastric pedicle several weeks prior to the planned pedicled TRAM flap reconstruction. Once the deep inferior epigastric vessels are divided, the choke vessels become dilated and blood flow through the superior epigastric pedicle becomes more robust. Upon harvest of the TRAM flap several weeks later, perfusion through the superior epigastric vessels and its perforators are optimized.

**Supercharging procedure for TRAM**

In a pedicled TRAM flap reconstruction of the breast, the inferior epigastric vessels can be anastomosed microsurgically to the thoracodorsal or internal mammary vessels to improve arterial inflow and/or venous outflow. Supercharging of the flap is only performed if inflow, outflow or both are compromised.

**RECONSTRUCTION AFTER BREAST CONSERVATION THERAPY**

Reconstruction after partial mastectomy and chest wall irradiation depends on patient selection and treatment-related factors. Factors that lead to aesthetically poor results after partial mastectomies include large resections and radial incisions, especially in small-breasted women. The resection of large amounts of skin, especially in the small-breasted patient, may result in contour deformities and nipple distortion. Furthermore, radiation therapy may result in a constricted, fibrotic skin envelope.

Reconstruction after breast conservation therapy is usually not necessary, as aesthetically acceptable results are judged excellent or good by 60% to 90% of patients. Nonetheless, if the general surgeon is concerned about the cosmetic outcomes after breast conservation surgery, then a plastic surgeon should be consulted during the preoperative period and should actively participate in the preoperative marking of the breast excision.

The latissimus dorsi flap is a useful in correcting any deficiencies of the skin and breast parenchyma. It is also used to rectify distorted nipple positioning. Recently, the use of endoscopy has been used to harvest the latissimus dorsi muscle for subsequent flap transposition to the mastectomy defect. A decrease in scarring is the principle advantage of the endoscopic technique over the open technique. Existing scars, especially those in the breast or axilla, may serve as
access incisions. The endoscope is most useful in elevating the distal aspect of the latissimus dorsi muscle.

**RECONSTRUCTION AFTER FAILED BREAST CONSERVATION**

Breast conservation therapy (BCT), defined as lumpectomy with radiation therapy, is the treatment of choice for stage I and II breast cancers. The 10-year local failure rate after breast conservation therapy has been reported as 14 to 19%.[20-22]

Patients who are diagnosed with recurrence of breast carcinoma after breast conservation therapy have to undergo total mastectomy. Unfortunately, post-mastectomy breast reconstruction in these patients is complicated by radiation fibrosis and endarteritis. Prior radiation to the chest compromises the blood supply to the native breast skin and impairs wound healing after the flap is transposed into the mastectomy defect.

In regards to the reconstructive options in this scenario, tissue expansion followed by permanent implant placement is a poor option. The radiated skin expands poorly and is prone to breakdown, with subsequent implant exposure. Studies by Dowden and Dickson and Sharpe revealed increased complication and failure rates when tissue expander/implant reconstruction was used following radiation therapy.[23,24]

Radiation therapy prior to autologous reconstruction has also been shown to increase the complication rate. For instance, the TRAM flap is negatively impacted by prior radiotherapy, as the superior epigastric vessels fall within the field of radiation. Watterson showed increased complication rates associated with patients undergoing TRAM flap reconstruction following radiation therapy compared with patients who did not receive prior irradiation. The overall complication rate for these patients was 37.4% versus 21.1% for those that did not receive radiation therapy. The rate of partial flap loss was 13.2% versus 3.4% for those that did not undergo radiation therapy.[25]

Considering these results, the best option for patients having undergone postmastectomy radiation therapy is the free TRAM flap. A bipedicled TRAM flap may also be considered. Both methods have the advantage of increased blood flow; thus overcoming the adverse affects of radiation endarteritis and fibrosis.

**Treatment of the contralateral breast**

Following post-mastectomy breast reconstruction, the contralateral, non-diseased, breast often requires alterations in order to achieve chest symmetry. Such modifications are performed via balancing breast augmentation, reduction or mastopexy.

**NIPPLE-AREOLAR RECONSTRUCTION**

The creation of a new nipple-areola complex (NAC) may be performed 6-8 weeks after the initial reconstruction, once the new breast mound has achieved a stable form. The new nipple position is marked preoperatively with the patient sitting in an upright position. This positioning is required to achieve symmetry with the contralateral side.

**Method selection**

There are three main techniques of nipple-areolar reconstruction. These are: 1) nipple sharing, 2) the skate flap and 3) the C-V flap. The technique chosen often depends upon the height and length of the contralateral nipple and the diameter, texture and color of the contralateral areola. It is also contingent upon the patient’s willingness to undergo nipple sharing from the non-diseased breast. Surgeon preference plays a large role in the method used.

**Nipple sharing**

The nipple sharing technique uses a composite graft from the contralateral nipple. This method is indicated only if the patient has a long, projectile donor nipple. It has the benefits of providing the most natural-appearing nipple,[26] with exact color and texture match. The surrounding areola is most often reconstructed with full-thickness skin grafting, although some surgeons prefer areolar tattooing. Full-thickness skin grafts can be taken from the mastectomy scar, the TRAM abdominal incision, the inguinal crease and the medial thigh.

The composite graft can be harvested from the donor nipple either by a wedge excision or by a cap amputation. The wedge excision harvest is performed by removing a quadrant of the donor nipple from the tip to the base, in the vertical dimension. The remaining donor nipple is turned downwards and sutured to the base of the nipple from where the tissue was excised.

The cap amputation should only be performed on patients with a long, projectile donor nipple. Simply, the tip is transversely amputated and grafted to the recipient site.
The donor site is closed with either a purse-string suture or a direct side-to-side closure. In order for the composite graft to take, the recipient site is de-epithelialized to provide a healthy, vascularized bed. The graft is then sutured into the proper location.

Skate flap
The skate flap is a local flap technique that utilizes skin and subcutaneous tissue from the center of the newly reconstructed breast mound. Essentially, winged, opposing flaps are wrapped around a centrally created post to produce a projectile nipple. This reconstruction is considered a reliable method of NAC reconstruction, with the potential for a long, projectile nipple[27] [Figure 4 a, b].

As with all NAC reconstructions, the location of the new nipple-areolar complex is marked while the patient is sitting upright in the preoperative holding area. A horizontal line is drawn across the areola, just superior to what will become the new nipple. The area within the areola, above this horizontal line, is de-epithelialized. A longitudinally oriented, cone-shaped marking is drawn extending from what will become the neo-nipple. On either side of this centrally located, cone-shaped marking, two wings are elevated laterally, initially at the level of the...
deep dermis. As the dissection approaches the central marking, the dissection becomes deeper. The central part of the flap consists of skin and fat, which is wedged out from the underlying tissue and is based superiorly where the neo-nipple was marked preoperatively. The lateral wings are then wrapped around this central, longitudinally oriented, skin-fat pedicle. The donor site (from where 2 wings were elevated) and the previously de-epithelialized area requires full-thickness skin grafting, which is taken from the groin or axillary portion of the mastectomy scar. The projection of the neo-nipple will reliably decrease postoperatively by 50% so overcorrection is mandatory.

C-V flap
The C-V flap is a modification of the skate flap. Instead of skin grafting the donor sites created by the raising of the lateral wings, this area is closed primarily. Thus, this technique has the advantage of avoiding skin grafting. Areolar tattooing can be performed to match the color of the contralateral areola. Unfortunately, this flap does not maintain vertical height as well as the skate flap [Figure 5a-c].

REFERENCES


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